

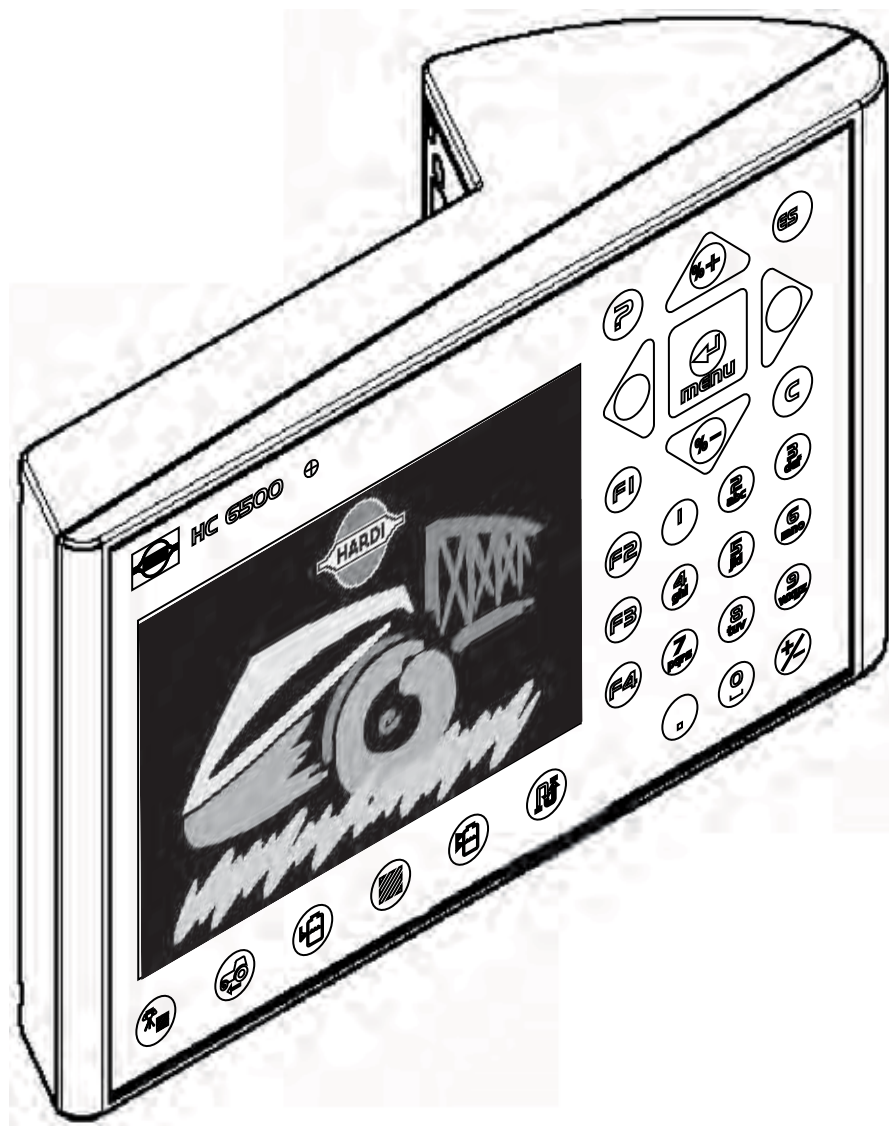
CONTROLLER HC6500



Service Manual - SW 1.2X

679096-210 - Version 2.10

GB - 04.2011





We congratulate you for choosing a HARDI plant protection product. The reliability and efficiency of this product depend upon your care. The first step is to carefully read and pay attention to this Service Manual. It contains essential information for the efficient use and long life of this quality product.

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As this service manual covers more models and features or equipment, which are available in certain countries only, please pay attention to paragraphs dealing with precisely your model.

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Introduction to this Service Manual

The primary aim of this manual is to help with fault finding. Each chapter is built up in the following template to offer the service person the quickest route to solving the problem:

- Feature
- General info/description
- Sensors involved
- Constants involved
- Pinning/plugs/colors/codes
- Fault finding options/results

Measurements Rules of thumb for HC 6500

This manual contains the most important information about HC 6500.

In order to diagnose the system efficiently, remember the following rules of thumb.

1. Always check the feature functions correctly according to the Operators Instruction Book
 - Does the boom rise when lift control button is activated upwards?
 - Does boom wing rise when tilt control button is activated upwards?
 - Does SafeTrack centre when centre button is activated?
2. Check the sensors are correctly installed and that the signals correspond to check values.
3. Check that all constants are stored in the system and that the values correspond to the machine specifications.
4. Check the basic calibration values, e.g. speed by driving 3.6 km/h i.e. 1 m/s with the sprayer. Compare HC 6500 forward speed with tractor speedometer. Drive 100 meters. This should take 100 seconds.

Extended Menu for sw x.xx

To access Extended Menu, press and hold the “ESC” button, switch the power ON and wait until the menu is opened.

The “[xxx]” indicates the choices or range.

The factory default and helpful notes like increments of change are in italics.

This is how the main Extended Menu looks like on the controller display:

Extended Menu	
E1	Language Sprog Spracke Langue
E2	Unit Metric or US
E3	Reserved
E4	Data exchange COM port set up
E5	Optional sensors
E6	Service interval
E7	Total register Master reset
E8	Settings Liquid sys Hydraulic
E9	Twin actuator setup
English Dansk Deutsch Francais	
Svenska Cestina Nederlandse Polski	

E1: Is the language choice.

E2: Is for what unit the controller shall use.

E3: Reserved

E4: Setup of the data communication.

E5: Setup of optional sensors. It is typically the pressure, fan revolutions and tank contents (TankGauge).

E6: Setup of the service interval.

E7: Setup of factory settings.

E8: Settings of the regulation, tank, track and misc. setting

E9: Is for setup of the TWIN actuators.

2 - Extended Menu

E1 Language	E1.01 English (Default)		
	E1.02 Dansk (Danish)		
	E1.03 Deutsch (German)		
	E1.04 Francais (French)		
	E1.05 Svenska (Swedish)		
	E1.06 Cestina (Czech)		
	E1.07 Nederlandse (Dutch)		
	E1.08 Polski (Polish)		
	E1.09 Russian		
	E1.10 Croatian		
	E1.11 Finnish		
E2 Unit	E2.1 Metric units (Default)		
	E2.2 US units		
E3 Reserved			
E4 Data exchange	E4.1 COM1 Setup	E4.1.1 Equipment type	E4.1.1.1 Printer
COM Port setup			Select if using a 12 volt printer
			E4.1.1.2 Dump
			Select if you want to dump data to a PC
			E4.1.1.3 Printer & Dump (Default)
		Select if you want to print to a 12 volt printer and data dump from the same COM	
		E4.1.1.4 VRA/remote	
		Variable Rate Application and remote control of liquid system	
		E4.1.2 Baud rate	E4.1.2.1 9600 baud (Default)
			Fastest Baud rate. Select 9600 for HARDI 12V printer
			E4.1.2.2 4800 baud
			Fast Baud rate
			E4.1.2.3 2400 baud
Medium speed Baud rate			
E4.1.2.4 1200 baud			
Slowest Baud rate			
E4.1.3 Protocol select	E4.1.3.1 HARDI VRA protocol		
HARDI protocol for variable rate application			
E4.2 COM2 Setup	E4.2.1 Equipment type	E4.2.1.1 Printer	
			Select if using a 12 volt printer
			E4.2.1.2 Dump
			Select if you want to dump data to a PC
			E4.2.1.3 Printer & Dump
		Select if you want to print to a 12 volt printer and data dump from the same COM	
		E4.2.1.4 VRA/remote (Default)	
		Variable Rate Application and remote control of liquid system	
		E4.2.2 Baud rate	E4.2.2.1 9600 baud (Default)
			Fastest Baud rate. Select 9600 for HARDI 12V printer
			E4.2.2.2 4800 baud
			Fast Baud rate
			E4.2.2.3 2400 baud
Medium speed Baud rate			
E4.2.2.4 1200 baud			
Slowest Baud rate			
E4.2.3 Protocol select	E4.2.3.1 HARDI VRA protocol		
HARDI protocol for variable rate application			

2 - Extended Menu

E5 Optional sensor	E5.01 Pressure	E5.1.1 Minimum value [-99.9 to 99.9]				
	Connected to section valve PCB	Default is 0,0 Bar. Key in pressure making sensor output 4mA. See sensor for min. value.				
		E5.1.2 Maximum value	[0 to 999.9]			
		Default is 10.0 Bar Key in pressure making sensor output 20mA. See sensor spec. for max. value.				
	E5.02 Fan speed	E5.2.1 Pulses per revolution [0 to 999999]				
	Connected to section valve PCB	Key in pulses per revolution. Set to 1 if one puls is given per revolution				
	E5.03 Tank contents sensor	E5.3.1 Tank contents	E5.3.1.1	Not present		
		Sensor Type	E5.3.1.2	Reserved		
			E5.3.1.3	Reserved		
			E5.3.1.4	HARDI Tank gauge		
		E5.3.2 Reserved	Pressure sensor fitted at the base of the tank			
	E5.04 Wind speed	E5.4.1 Wind speed not used				
	E5.05 Wind direction	E5.5.1 Wind Direction 0 deg	min	0	min	0
		E5.5.2 Wind Direction 359 deg	max	359	max	359
	E5.06 Air temperature	E5.6.1 Air temperature min	min	-20	min	-20
		E5.6.2 Air temperature max	max	70	max	70
	E5.07 Relative humidity	E5.7.1 Minimum value	min	0	min	0
		E5.7.2 Maximum value	max	100	max	100
	E5.08 PTO pump R/min sensor		PPU	1	PPU	1
	E5.09 Extra sensor 1F	E5.9.1 PPU		1	PPU	1
		E5.9.2 Extra1 name				
		E5.9.3 Extra1 unit				
	E5.10 Extra sensor 2F	E5.10.1 PPU		1	PPU	1
		E5.10.2 Extra2 name				
		E5.10.3 Extra2 unit				
	E5.11 Extra sensor 3F	E5.11.1 Extra sensor 3A Min		0	Volt	0
		E5.11.2 Extra sensor 3A Max		5	Volt	5
		E5.11.3 Extra3 Name				
	E5.11.4 Extra3 Unit					
E5.12 Extra sensor 4F	E5.12.1 Extra sensor 3A Min		0	Volt	0	
	E5.12.2 Extra sensor 3A Max		5	Volt	5	
	E5.12.3 Extra4 Name					
	E5.12.4 Extra4 Unit					

E6 Service Interval PIN = 04711	E6.1.1 Check filters	A hours	10 hours
	E6.1.2 Grease boom	B hours	50 hours
	E6.1.3 Grease track and centre	C hours	250 hours
	E6.1.4 Miscellaneous service	D hours	Hours are not defined
	E6.1.5 Check nozzles	Nozzle	50 hours

E7 Total register Master reset	E7.1 Total register	<i>Register 0. Shows start & stop dates & time</i>	
	E7.2 Factory default Master reset	Code	Function
		89898	Store a backup of the current configuration
		88888	Recall backup of configuration stored with 89898
		12345	Resetting all parameters except register 0 and the backup configuration stored with code 89898
		74650	Resetting all parameters to factory default settings

2 - Extended Menu

E8 Settings Liquid sys Hydraulic	E8.1 Pressure regulation valve	E8.1.1 Minimum duty cycle	[2%] Minimum and default is 2%. Increase value if motor hesitates to turn. A high value will cause instability. For LookAhead, set to 5% +/- 1%.		
		E8.1.2 Minimum speed	[0.5Km/t]. Default is 0.5 Km/h. Speed where regulation valve starts. Will not regulate under this value.		
		E8.1.3 Minimum pressure	[0.0 Bar] Pressure where regulation valve starts. Needs a pressure sensor. Default is 0.0 Bar.		
		E8.1.4 Reserved			
		E8.1.5 LookAhead	[Disabled/Enabled] Default = Disabled. Regulation valve must have position feedback transducer and Boom sensor must be fitted.		
		E8.1.6 Regulation delay	[0 to 9 Sec. (Default = 3 seconds.) Delay to permit flow stability before flow sensor controls regulation valve. For few boom sections and or high liquid flow, 3 s is recommended. For many boom sections and or small liquid flow, 1 or 2 s is recommended.		
		E8.1.7 Sensors	E8.1.7.1 Pressure	E8.1.7.1.1 Pressure sensor: Passive (Default) Pressure sensor used for read-out purpose only.	
				E8.1.7.1.2 Pressure sensor: active Pressure sensor used for regulation at low flow	
			E8.1.7.2 RPM	Future use	
		E8.2 Tank	E8.2.1 Tank size	[L] Enter true tank size. Used by AutoFill and AutoAgitation	
		E8.2.2 Reserved			
		E8.2.3 Data points	Calibration values for HARDI TankGauge Read out of: Data point number, measured water level and recorded volume.		
	E8.3 Reserved				
	E8.4 Track setup and test	E8.4.01 Track disable/enable (Default disabled) To disable/enable SafeTrack and safety system function.			
		E8.4.02 Rear angle sensor	E8.4.2.1 Read out	Actual gain setting and sensor reading	
			E8.4.2.2 Reserved		
			E8.4.2.3 -->	Right gain factor	
			E8.4.2.4 <--	Left gain factor	
		E8.4.03 Chassis	[CM05 Small, CM05 Medium, CM05 Large] Default CM05 M. For Commander use Small for 3200, Medium for 4400, Large for 6600. For Navigator use NAV07 Medium		
		E8.4.04 Sprayer draw bar length	[0-200 cm] Default for CM: 100 cm Length from draw bar pin hole to front anchor bolt for draw bar.		
		E8.4.05 Manual angling speed	[-9% to 9%] (Default is 0) Sets the manual steering speed. Note +/- can be changed by toggling.		
		E8.4.06 Boom fold sensors	[1,2] This is the number of boom fold sensors present. Default: 1. LPZ,HAZ,HPZ,FTZ,use 1 sensor. SPC, SPZ use 2 sensors.		
		E8.4.07 Error print for overspeeding	[Yes] Prints last 3 hazardous situations and shows Alteration log changes.		
		E8.4.08 Minimum radius permitted	[6,0m] Min. turning radius allowed for the trailer. Tank size 3200 L= 6.5, 4400 L= 7.0, 6600 L= 9.0. Increase to achieve a soft-stop on track cylinders.		
		E8.4.09 Maximum speed when turning	[Km/t] Default 18km/t or 11 mph. Above set speed, no angling is possible.		
E8.4.10 Safety factor for SafeTrack		[100%] Raising this value increases captiousness. Default is 100% for a CM 4400. For CM 3200, use 90%. For CM 6600, use 120%.Use steps of 10% as a guide to changes.			
E8.4.11 Half steer		[Disabled/Enabled] Default = Disabled. Disable option for Eagle (SPC) boom to steer to one side while the opposite side is folded			

2 - Extended Menu

E8 Settings	E8.5 Miscellaneous	E8.5.1 Foot switch	[ON/OFF is Disabled, Toggle, Pulse] <i>For remote On/Off of main switch, it allows the use of other switch system</i>
		E8.5.2 Step size % or 3-step rate	[Step size: xx%] (Default is 10%) <i>Can be altered. If set at 0%, this allows 3 rates to be set up in menu 1.1</i>
		E8.5.3 Capacity left	[Distance, Area] <i>Affects readout from Display icon. Will show distance or area remaining</i>
		E8.5.4 AB switches setup	E8.5.4.1 AB switches disable E8.5.4.2 Valve or lamp E8.5.4.3 Hydraulics DAH E8.5.4.4 Hydraulics Delta DH
		E8.5.5 Foam marker	[No foam marker, Foam marker mounted] <i>Also setup menu 2.2.2</i>
		E8.5.6 Startup picture	Select desired startup picture
	E8.6 Sprayer type Liquid, boom	E8.6.1 Liquid system	E8.6.1.1 Equalization EVC <i>Choose if system has return flow of liquid from section valve EVC type</i> E8.6.1.2 No equalization EFC <i>Choose if system has no return flow of liquid from section valve EFC type</i> E8.6.1.3 PrimeFlow <i>PrimeFlow is the circulation system</i>
		E8.6.2 Dual Line	E8.6.2.1 Dual Line system type <i>2 sets of boom tubes and valves. Only EVC</i> E8.6.2.2 Sensor type line change <i>Pressure or speed based sensor</i> E8.6.2.3 System lag <i>Time lag to prevent osc. between the 2 spray lines</i> E8.6.2.4 Line overlap <i>Time the spraying overlaps so the liquid system stabilizes</i>
		E8.6.3 Boom fold hydraulics	E8.6.3.1 Force m. HPZ, HAZ E8.6.3.2 Force m. FTZ E8.6.3.3 Delta m. LPZ E8.6.3.4 Eagle m. SPC E8.6.3.5 Alpha GVA E8.6.3.6 TWIN Force 32-36m
		E8.6.4 PrimeFlow setup	E8.6.4.1 Test Nozzle positions <i>Each nozzle is open for 2 sec. Check that sequence does not jump</i> E8.6.4.2 Assign nozzle position to SMCU <i>Assign nozzle position after replacement. Confirm nozzle position after master reset.</i> E8.6.4.3 Reset nozzle position in SMCU <i>Reset all connected SMCU's to prepare for assignment of new nozzle type</i> E8.6.4.4 Force to 2 motor SMCU <i>For service a 3 motor SMCU can be forced to be a 2 motor drive</i> E8.6.4.5 Reserved E8.6.4.6 Change Nozzle order <i>Key in SMCU number for change of nozzle order at brackets</i>

2 - Extended Menu

E8 Settings	E8.6 Sprayer type Liquid, boom	E8.6.5 AutoWash and AutoFill setup	E8.6.5.1 Select AW AF options	E8.6.5.1.1 None <i>Nothing installed</i> E8.6.5.1.2 AutoWash installed <i>Select if AutoWash installed</i> E8.6.5.1.3 AutoWash/AutoFill instal. <i>Select if AutoWash/AutoFill installed</i> E8.6.5.1.4 AutoFill installed <i>Select if AutoFill installed</i>
			E8.6.5.2 Pump setup	E8.6.5.2.1 NCM 3200/4400 <i>AutoWash is automatic.</i> <i>SuctionValve standard direction</i> E8.6.5.2.2 NCM6600 single pump <i>AutoWash is automatic.</i> <i>SuctionValve rotated 180grd</i> E8.6.5.2.3 NCM6600 double pump <i>AutoWash prompts for start and stop on tractor hydraulic lever</i> E8.6.5.2.4 NCM9000 double pump <i>AutoWash prompts for start stop on tractor hydraulic lever</i> E8.6.5.2.5 Hardi Alpha 2500 3000 <i>SuctionValve and PressureValve is turned 90 degrees</i> E8.6.5.2.6 Hardi Alpha 3500 4100 <i>SuctionValve and PressureValve is turned 90 degrees</i> E8.6.5.2.7 Saritor 4000 5000 <i>2 position valves</i> E8.6.5.2.8 Navigator07 <i>2 position valves</i>
			E8.6.5.3 AutoAgitation setup	E8.6.5.3.1 Tank level for full to half <i>Key in tank level% for shift from full tank to half tank</i> E8.6.5.3.2 Tank level half to empty <i>Key in tank level% for shift from half tank to almost empty tank</i> E8.6.5.3.3 Powerful agitn full tank <i>Adapt to risk of sedimentation but no risk of foaming</i> E8.6.5.3.4 Powerful agitn half tank <i>Adapt to small risk of sedimentation, some risk of foaming</i> E8.6.5.3.5 Soft agitation full tank <i>Some agitation needed, no risk of foaming</i> E8.6.5.3.6 Soft agitation half tank <i>Adapt to risk of foaming. Ensure a little agitation</i>
			E8.6.5.4 AutoWash print report <i>Prints timestamps and water amounts transferred in each step. Select print report from 1 to 8.</i>	
			E8.6.5.5 Register for AutoWash <i>Key in register no. If 0, wash is added to actual spraying register.</i>	

E9 TWIN Actuator Setup	E9.1 Fan speed Air angle	E9.1.1 Fan speed setup	E9.1.1.1 Fan speed forward <i>Select forward for trailed sprayers</i> E9.1.1.2 Fan speed reverse <i>Select reverse for ALPHA sprayers</i>
		E9.1.2 Air angle setup	E9.1.2.1 Air angle forward <i>Select forward for trailed sprayers</i> E9.1.2.2 Air angle revers <i>Select reverse for ALPHA sprayers</i>
		E9.1.3 Select TWIN actuator Type	E9.1.3.1 TWIN actuator Linak <i>Select TWIN actuator type Linak</i> E9.1.3.2 TWIN actuator new <i>Not available</i>

General info/description

Each computer (Terminal, Grip etc.) unit has a red LED, which indicates condition and status of the computer. When all is ok the LED is constantly on.

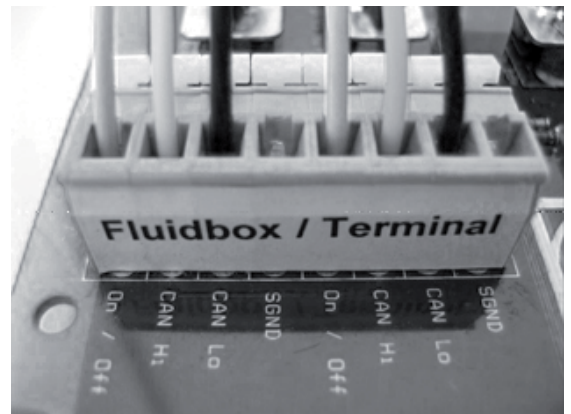
Pinning/plugs/colors/codes

Mounting of CAN-BUS cables

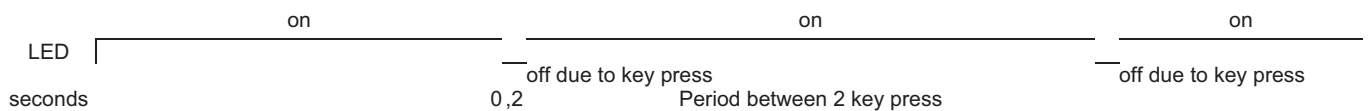
CAN cables for the Jobcom are mounted on CAN On/Off, CAN Hi, and CAN Lo at the bottom left side in the JobCom PCB

Signal / cables:

Yellow	to CAN Hi
Green	to CAN Lo
Blue	to On / Off
SGND	is not used



When a key is pressed, the LED confirms by turning off for 0.2 sec.

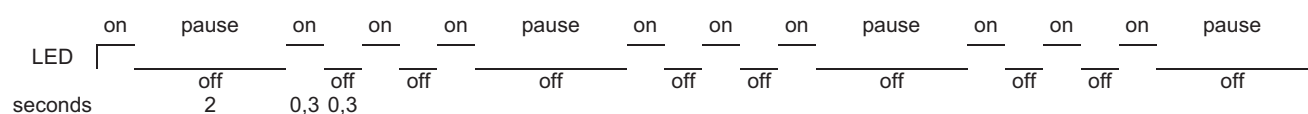


The blink code consists of a sequence of blinks. A blink is a 0.3 second "on" of the LED. The blinks in a blink code are separated by a 0.3 second "off" of the LED.

Complete blink codes are separated by a 2 second "off" of the LED.

Only 1 fault is shown at a time. Fault codes are shown in order of priority.

Diagram below shows a 3 blink code



3 - CAN-BUS

Fault finding options/results

E = Error

P = When programming

Name	LED code	Explanation	
Power off	LED off	CPU crashed when LED was turned off	E
CPU crashed			
CPU crashed	LED on	CPU crashed (when LED was turned on), loosing control over LED No LED reaction on key press	E
CPU is ok	LED on	Connection to CAN is ok	E
No key is pressed			
Key is pressed	LED on, except off for 0.2 sec	Confirm that key press is read by CPU	E
CAN bus short circuit	1 blink code	Short circuits of cables: CANH or CANL connected to ground, 5Volt or 12Volt Detected by CAN transceiver Blink code is sent continuously	E
CAN bus open circuit	2 blink code	CAN controller Busoff error. Mostly due to no other computer on CANbus Blink code is sent continuously	E
JobCom not connected	3 blink code	No contact to JobCom. Receives no alive telegrams from JobCom Blink code is sent continuously. This code is disabled for JobCom	E
Data missing	4 blink code	Data (expected/subscribed) from other computer is not received. Other computer is Busoff or disconnected. Blink code is sent once. This code is disabled for SetBox, Grip, FluidBox	E
Ready for SW upload	5 blink code	Ready for software upload. Activated by Pin 17 BootLoadEnable Blink code is sent continuously	p
Terminal not connected	6 blink code	No contact to terminal. Receives no alive telegrams from terminal Blink code is sent continuously. This code is disabled for terminal	E
Received data is invalid	7 blink code	Computer software versions are incompatible, data sent from other computer cannot be used by this computer. Blink code is sent once per invalid data. This code is disabled for SetBox, Grip, FluidBox	E
SW upload successful	8 blink code	SW upload successful. Blink code is sent continuously	p
Watchdog reset	9 blink code	Watchdog reset. Note the watchdog is the CPU monitoring that all tasks are run. The watchdog does not detect when the CPU crashes. Blink code is sent once	E
Cannot logon	10 blink code	Cannot logon. CANbus address claimed by other computer Blink code is sent continuously	p
Loading software	Fast blinking 10Hz	Loading software. Blink code is sent continuously	p

LED on Jobcom

JobCom	New HC6500	New HC6500
LED	Green D27	Red D28
While starting	Version no, integer part	Version no, fractional part
While operating	0.5Hz	As for terminal
Ready for SW upload	Off	5 blink code
Loading software	Off	Fast (10Hz)
SW upload successful	Off	8 blink code

Measurements

The Blue CAN On/Off turns the units on when it is high (>2.0V) and off when it is low (<1.0V)

General

The software in the HC6500 and Jobcom can be upgraded. Examples for this are improvements for better performance and bug fixes.

When the software for the controller is changed, it will be available from Hardi's Technical Service department. The software can be sent as an attached Zipped file on the E-mail.

HC6500 Upgrade:

An update of the HC6500 will erase the settings saved in the HC6500 Controller, e.g. display and port settings.

JobCom Upgrade:

If the JobCom software is 1.15 and the new upgrade software is higher than 1.30, the settings in the JobCom will remain in the memory of the JobCom.

If the JobCom software is lower than 1.15 all settings are erased and all parameters have to be setup again manually.

After an update of the JobCom it needs up to 60 sec. to reset itself. The reset is performed after the first power up of the JobCom. It is not possible to see on the JobCom when it is resetting or when it is finished.

If the HC6500 is powered up in normal mode it will show alarm 110, "Warning JobCom resetting" when the JobCom is resetting, when it is finished alarm 111, "Alarm Switch HC6500 OFF & ON" will appear.



NOTE: Do not power up the HC6500 in Extended menu first time after a software update, the alarm will not appear in extended menu and all settings done when the JobCom is resetting will be erased during the reset.

Use following codes to reset the system:

Code	Function
89898	Store a backup of the current configuration
88888	Recall backup of configuration stored with 89898
12345	Resetting all parameters except register 0 and the backup configuration stored with code 89898
74650	Resetting all parameters to defaults

It is recommended strictly to follow these update sequences when updating the JobCom and HC6500:

A. Keep everything as is:

- Update the JobCom.
- Update the HC6500 Controller.
- Setup the HC6500.
- Test all functions of the HC6500, JobCom and sprayer.
- Store the configuration in the JobCom. Enter code 89898.

B. Keep current setup and register 0, reset user registers and alarm log files:

- Update the JobCom.
- Update the HC6500 Controller.
- Setup the HC6500.
- Store the configuration in the JobCom. Enter code 89898.
- Reset register and alarm log files. Enter code 12345.
- Recall the configuration in the JobCom. Enter code 88888.
- Test all functions of the HC6500, JobCom and sprayer.

4 - Software and Communication

C. Programming a new HC6500 and a new JobCom:

- Update the JobCom.
- Update the HC6500 Controller.
- Setup the HC6500 and JobCom.
- Store the configuration in the JobCom. Enter code 89898.
- Reset register and alarm log files. Enter code 12345.
- Recall the configuration in the JobCom. Enter code 88888.
- Test all functions of the HC6500, JobCom and sprayer.

Read the chapters "JobCom software upgrade" and "HC6500 software upgrade" for a detail description of how to perform a update.

Software program for the controller

The software sent in a mail as Zip file.

The Zip file must be unpacked and put into a folder.

The top file (HardiExeUploadWinvxxx.exe) is the upgrade program.

The two other files (xxx.bin) are the software for the controller and the Jobcom.

This example show HC5500 software file "HardiV316.bin" with software version is 3.16.

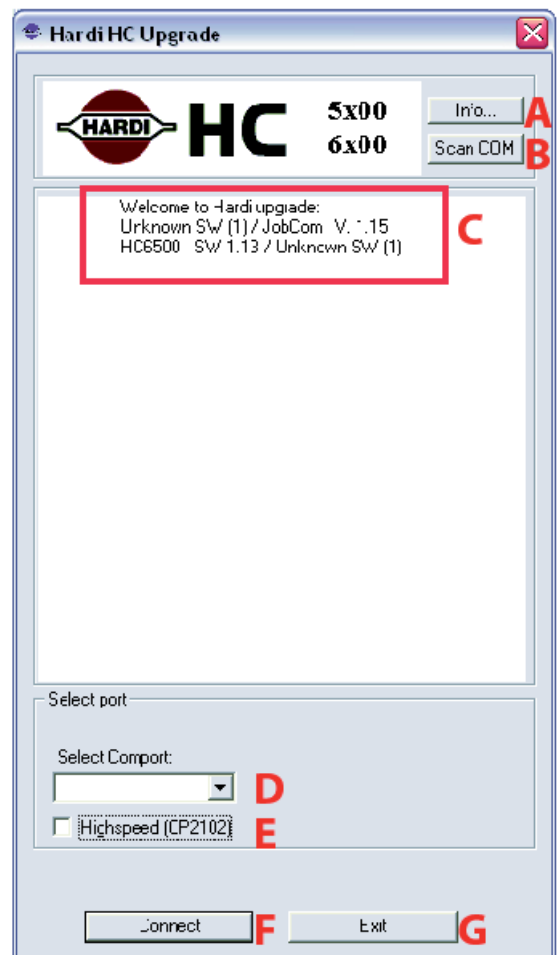
The Jobcom reads "HardiJCV1.11.bin" with software version 1.11.

i Note: It is very important that these three files are in the same folder at all time otherwise will the upgrade program not work.

When the program is activated, a dialogue box will appear on the PC. In the dialogue box, the software version for both the controller and the Jobcom can be seen before the software is uploaded.

How to use the Hardi upgrade program is described in section "Software upload HC6500" and "Software upload Jobcom".

- A. Information about the current version of Hardi HC Upgrade and the software in the connected controllers.
- B. Here you do a complete serial port scan.
- C. Shows the software available in current folder on the PC: HC5500 3.25, HC6500 1.02 and JobCom 1.26
- D. Here you select the PC comport to use.
- E. Only for production purposes.
- F. Start upgrade.
- G. Exit program.



4 - Software and Communication

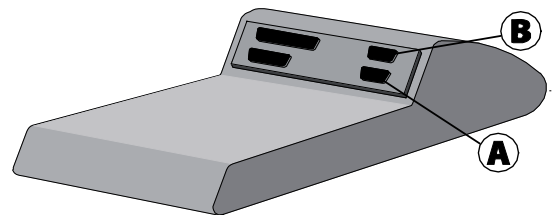
Information from the Info button in step A:



Communication cable

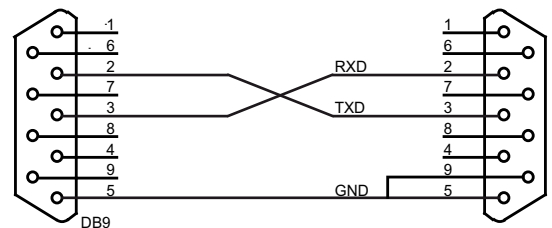
The connection from the PC to the controller is made with HARDI cable P/N 72271600.

The cable has a short circuit in one of the connector, normally where the label is. For software update this means HC6500 port A.



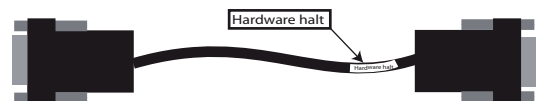
HARDI cable, P/N72271600, connections

Loop in communication cable pin 5 and 9.



The cable is marked with "Hardware halt" at the end with the loop. The mark is on the cable or with a yellow sticker on the connector.

If the cable is turned the wrong way, the software upgrade is not possible.



The communication cable is shown on the spare part CD, pages M302. Part number for the cable is 72271600 and can be ordered as a normal spare part.

USB to RS232 Converter

If there is no RS232 port, or problems with the Com port on the computer, use a converter from USB to RS232.

The systems requirement to use a converter is:

A computer with Windows XP or later.

USB to RS232 serial converter, Hardi P/N 26025900.

Serial NULL-modem cable, or Hardi "Communication cable" P/N 72271600.



4 - Software and Communication

Install the USB to RS232 serial converter using the instructions and driver, which should be included with the USB to RS232 serial converter.



NOTE: Do not plug the USB-RS232 converter into the system before the driver is finished installing

Insert the CD-Rom with the driver in the drive.

Select "Search for the best driver in these locations" and "Search removable media floppy, CD-ROM" and select Next

At this screen select "Next"



Accept the "Information" window by pushing the "Next" button



4 - Software and Communication

Select restart the computer now.

Push the "Finish" button. After a restart of the computer the adaptor is ready to use.



Verify comport number.

Before you can start upgrading your Hardi controller, you need to find the number of the USB-serial Converter.

Click on the Windows "start" button and select "Control panel".



Double-click on the "System" icon.

Click on the "Hardware" tab.

Click on the "Device manager" button



4 - Software and Communication

Find and expand the "Ports" icon by clicking on the '+' left to the icon.

Now you will see a screen not so different from the picture above. Here you see that there are many devices using a COM number, This may varies from PC to PC.

In this case it is COM7.

But keep in mind, that this is just a guide, you need to see your self, what number your "Serial On USB Port" has been installed on.

With this number in mind you can close the Device Manager window, and continue to next step.



4 - Software and Communication

HC6500 software upgrade

Enter menu 4.8.2 to see the current software version in the controller

If the software version of the JobCom is 1.15, 1.30 or higher prior to the upgrade is it possible to save and recall the current configuration of the JobCom after the update.

In menu E7.2 Enter code 89898 to save the configuration and code 88888 to recall the configuration.

The HC6500 display and port settings will not be saved.

4.8.2 Software versions all computer

Terminal HC 6500	1.55	Version
JobCom HC 6100	1.55	Version
Grip HC 6300	1.15	Version
SetBox HC 6400	1.15	Version
FluidBox HC 6200	1.00	Version

Computer detail screens show details in case of faults



It is always a good procedure to print or save the system configuration before a software upgrade, see chapter "Dump of data from HC6500 Controller" how to dump the configuration to the PC.

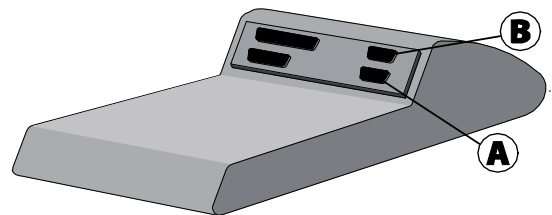
The communication cable without the "Hardware halt" is plugged into the PC.

This is done before the computer is powered up.

The communication cable with the "Hardware Halt" is plugged into the HC6500 in COM 1 (A) port.

Power ON the PC

Power ON the HC6500



The HC6500 beeps 3 times at start-up to indicate it is ready to upgrade. In addition, the red LED continues to flash 5 times and then pause. The screen will stay black during upgrade.

The controller awaits contact to the Hardi HC6500 upgrade software programme.

On the PC, the upgrading program can be started up and the PC dialogue box should look like this.

The dialogue box shows what software version will be uploaded to the HC6500 Controller.

Communication port has to be chosen.

If you use a USB-Serial converter see section "USB to RS232 Converter" how to find the Com port number.

Select "Connect".

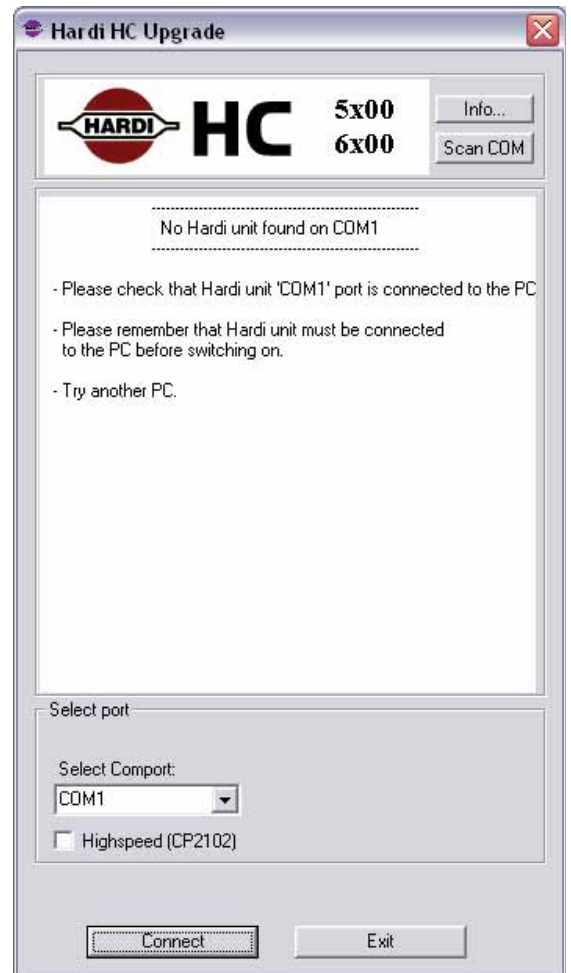


NOTE: High-speed (CP2102) can only be used for production purpose.



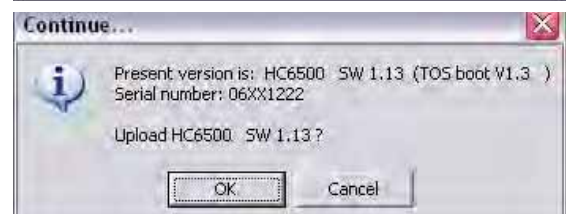
4 - Software and Communication

If there are problems with the connection the upgrading program will tell what kind of error there is and what can be done to solve the problem.



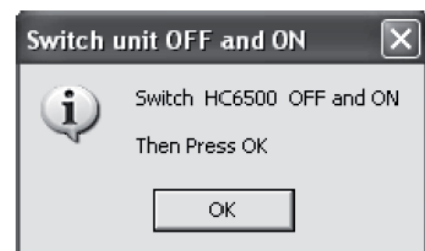
When you press "Connect" the upgrade begins, after a little while, you will be prompted with a window.

There are two versions of this window; one where you have to upload a new boot and a new application. This looks like the window to the right.



The only difference between the two versions is the "Upload new boot..." line. This is because it isn't always necessary to upload a new boot, to upload new application software.

- Click "OK" to upgrade HC6500.
- If HC6500 needs to upgrade boot software it will erase the old one, and the "Hardi HC Upgrade" will upload a new version.
- If it was necessary to upgrade the boot software (if not, skip this step), you will be prompted with the following window after the boot upload.



4 - Software and Communication

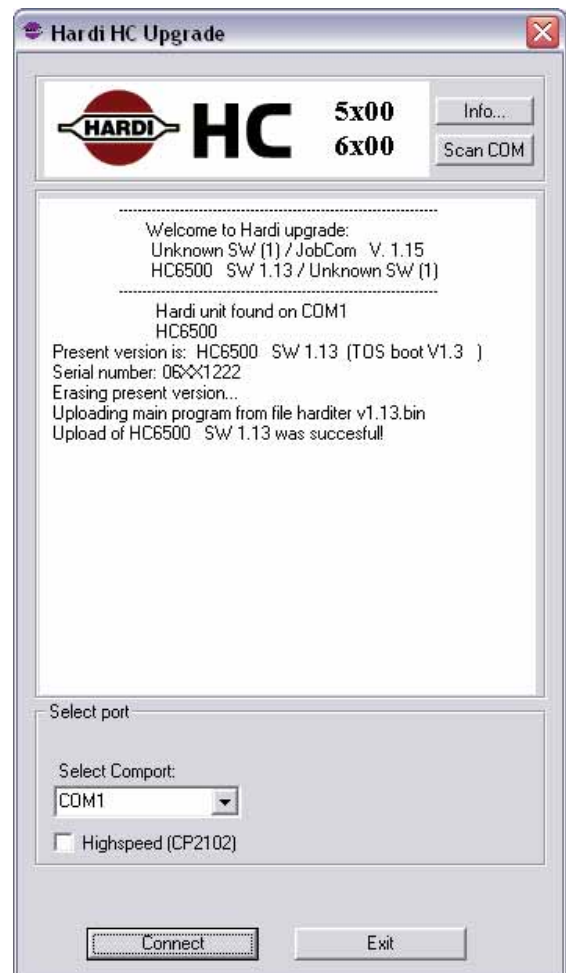
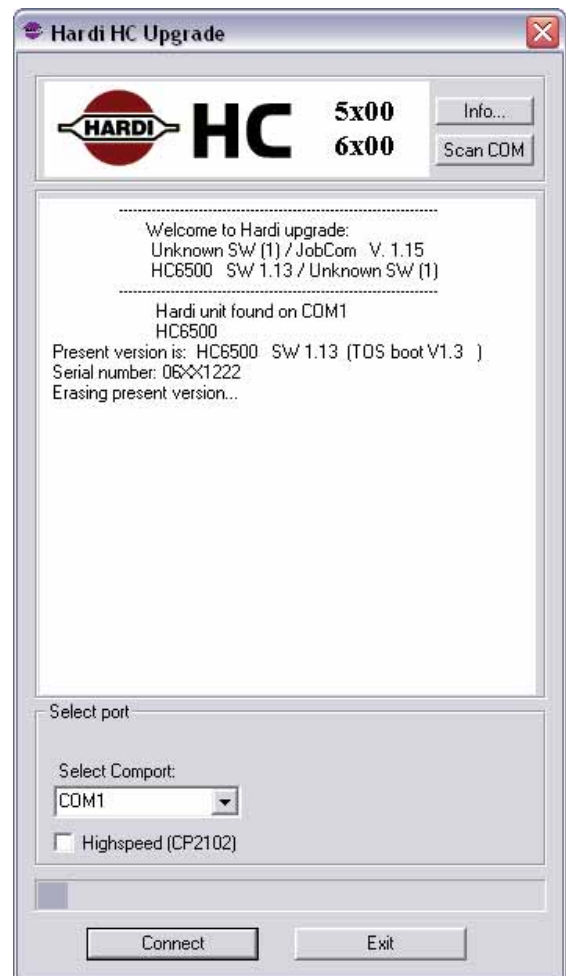
- Turn off and on the power on HC6500 and wait until HC6500 have beeped 3 times and the red LED continues to flash 5 times and then pause. Then click "OK" to continue upgrading HC6500.
- Afterwards "Hardi HC Upgrade" will erase the current application on HC6500 and upload the new one.

The upgrade takes about 5-10 minute.



WARNING: Do not power down the PC during the upgrade.

- Finally "Hardi HC Upgrade" will prompt: "Upload of HC6500 SW X.XX was successful!".



4 - Software and Communication

Read first page in this chapter “Software and Communication” to decide if or which reset/recall code should be used to complete the upgrade of the HC6500.

E7 Total register Master reset	
E7.1	Total register
» E7.2	Factory default/Master reset
Enter PIN	
Enter 88888 for restore to custom default	



WARNING: Code 74650 will erase all settings in the HC6500 Controller and the JobCom, also the stored backup saved with code 89898.

JobCom software upgrade

Enter menu 4.8.2 to see the current software version in the JobCom.

If the software version of the JobCom is 1.15, 1.30 or higher prior to the upgrade is it possible to save and recall the current configuration of the JobCom after the upgrade.

In menu E7 enter code 89898 to save the configuration and code 88888 to recall the configuration.

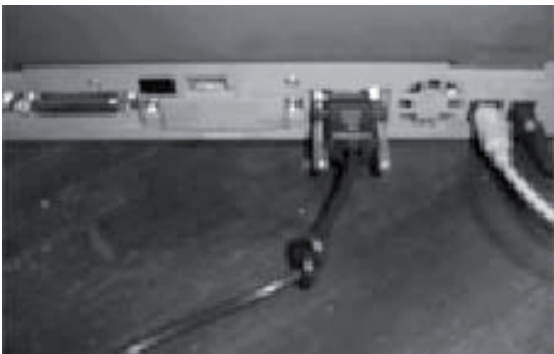
The HC6500 display and port settings will not be saved.

4.8.2 Software versions all computer		
Terminal HC 6500	1.13	Version
JobCom HC 6100	1.15	Version
Grip HC 6300	1.15	Version
SetBox HC 6400	1.15	Version
FluidBox HC 6200	1.00	Version
Computer detail screens show details in case of faults		

i NOTE: It is always a good procedure to print or save the system configuration before a software upgrade, see chapter "Dump of data from HC6500 Controller" how to dump the configuration to the PC.

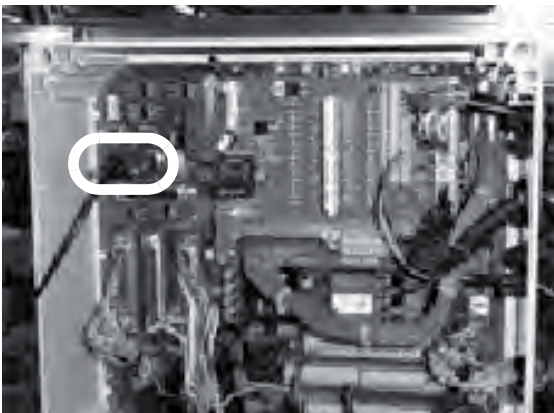
The communication cable without the "Hardware halt" is plugged into the PC.

This is done before the computer is powered up.



The communication cable with the "Hardware Halt" is plugged into the JobCom.

The communication cable is plugged into the Jobcom before it is switched on.



Power ON the PC

Power ON the JobCom on Spray box.

To be sure that JobCom is ready to be upgraded, ensure that the red LED flashes 5 times and then pause in a loop.

Here you notice the circle which surrounds the red LED on the JobCom.



4 - Software and Communication

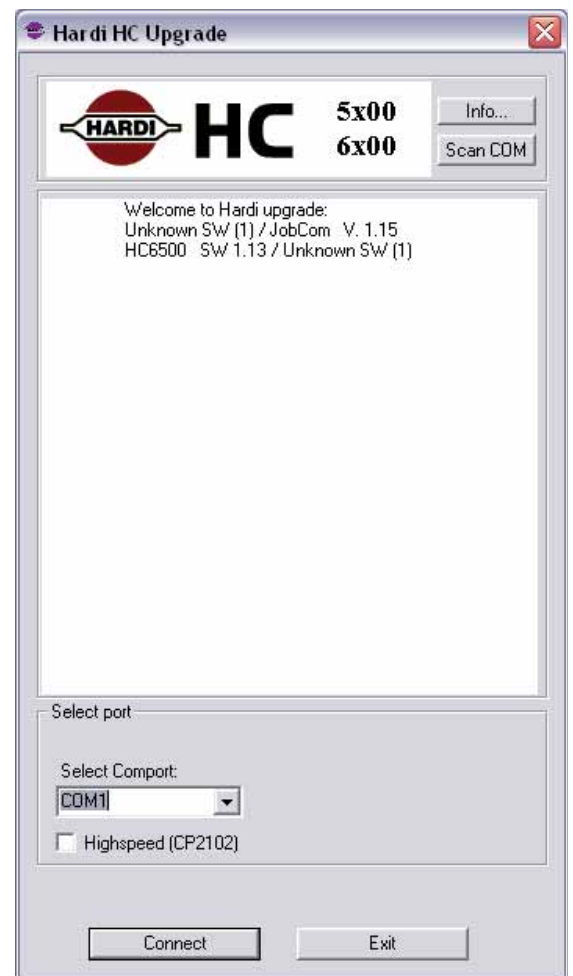
On the PC, the upgrading program can be started up and the PC dialogue box should look like this.

The dialogue box shows what software version will be uploaded to the JobCom.

Communication port has to be chosen.

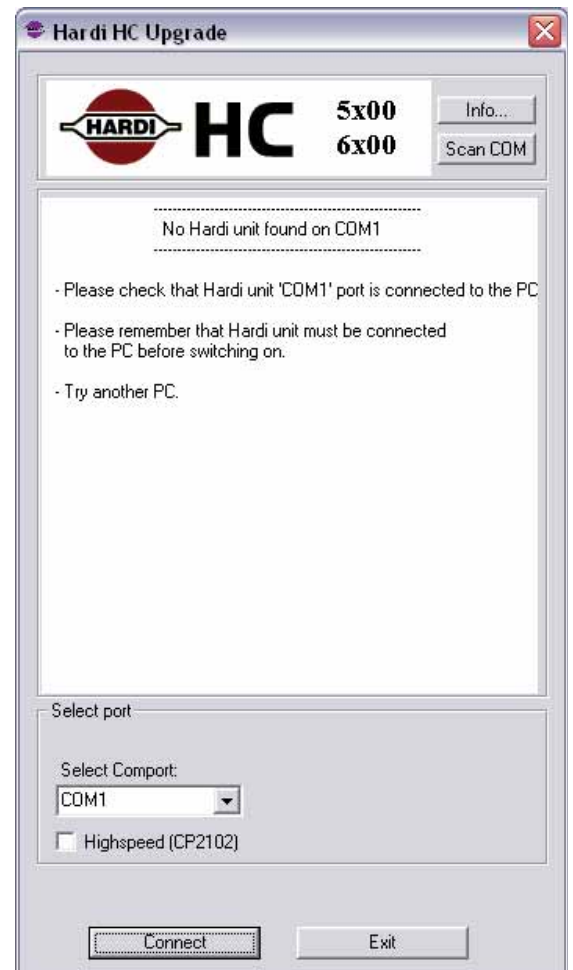
If you use a USB-Serial converter see section "USB to RS232 Converter" how to find the Com port number.

Select "Connect".



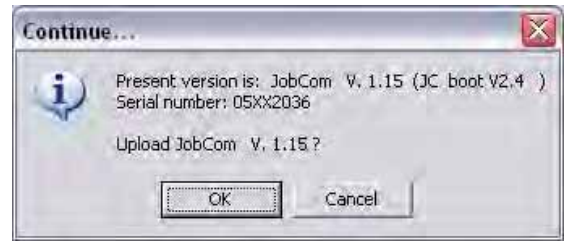
If the upgrade program does not find a connection between the Jobcom and PC, this error message will appear.

If this message appears, then see if the cable is attached correctly and there is power on the controller. If this does not help, power down the PC and the controller and start all over.



4 - Software and Communication

When you press "Connect" the upgrade begins, after a little while, you will be prompted with a window. There are two versions of this window, one where you have to upload a new boot and a new application. This looks like the window to the right.



The only difference between the two versions is the "Upload new boot..." line. This is because it isn't always necessary to upload a new boot, to upload new application software.

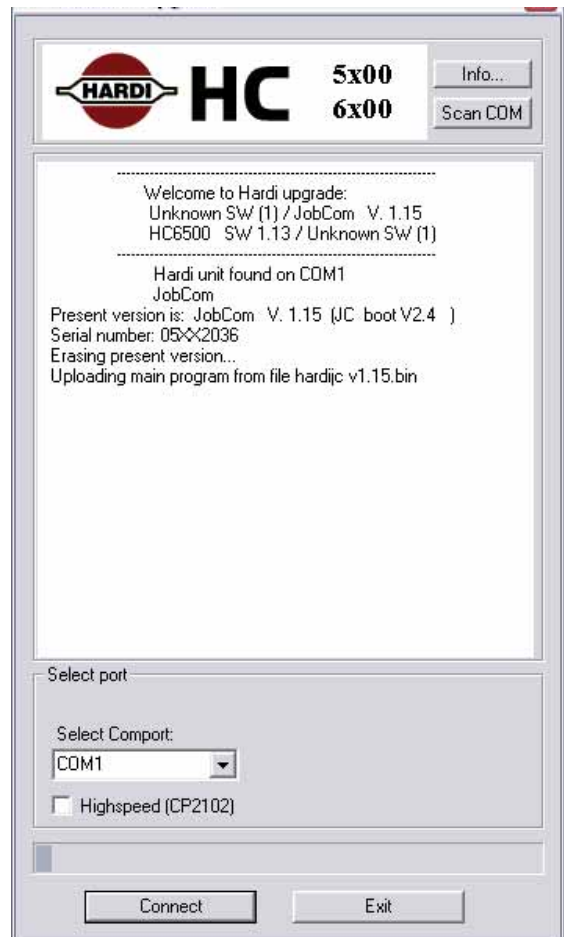
- Click "OK" to upgrade JobCom.
- If JobCom needs to upgrade boot software it will erase the old one, and the "Hardi HC Upgrade" will upload a new version.
- If it was necessary to upgrade the boot software (if not, skip this step), you will be prompted with the following window after the boot upload:



- Turn off and on the power on JobCom and wait until JobCom red LED continues to flash 5 times and then pause in a loop. Then click "OK" to continue upgrading JobCom.

- Afterwards "Hardi HC Upgrade" will erase the current application on JobCom and upload the new one.

The bottom bar of the display dialogue box indicates the upload progress.



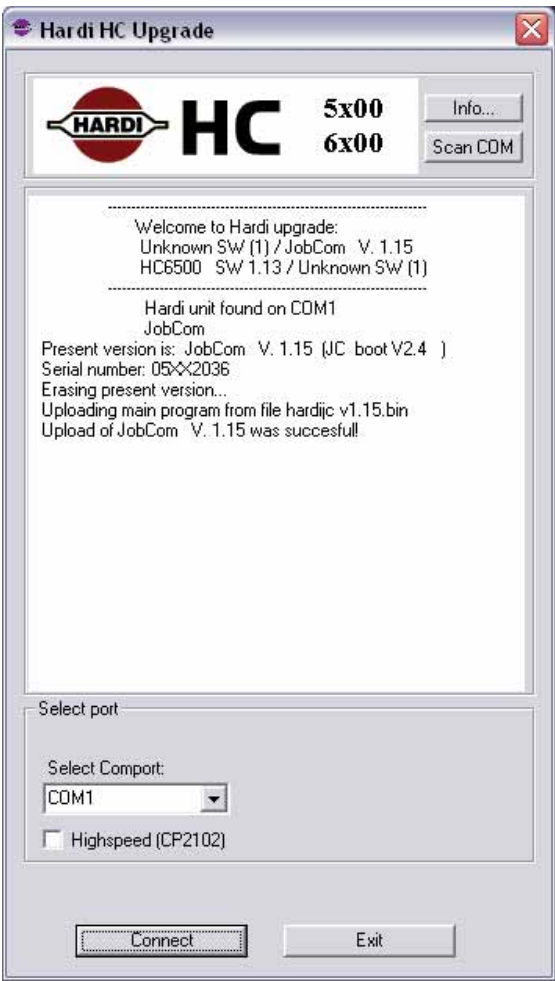
When the upload of the new software has started, diode N28 and D27 will start to flash together with the watchdog.



4 - Software and Communication

- Finally "Hardi HC Upgrade" will prompt: "Upload of JobCom SW X.XX was successful!" and you are done.

If the updating was not successful, try again.
Check the power supply to sprayer and PC.



Read first page in this chapter "Software and Communication" to decide if or which reset/recall code should be used to complete the upgrade of the JobCom.

E7 Total register Master reset	
E7.1	Total register
» E7.2	Factory default/Master reset
Enter PIN	
Enter 88888 for restore to custom default	



WARNING: Code 74650 will erase all settings in the HC6500 Controller and the JobCom, also the stored backup saved with code 89898.

Software error codes

Controller error codes

Error codes can be a combination of the below:

E.g. Code 6040: This is a combination of code 6000 and code 40 where 6000 means it could not write to the serial port and 40 means a reply is missing.

Codes indicating the uploader program has gone into a non-existence mode:

555
666
777
888
999

Codes for Send Data () errors:

1000 Serial port is not open
2000 Could not write to serial port (API-call WriteFile() failure)

Codes for GetData() error:

5000 Serial port is not open
6000 Could not write to serial port (API-call WriteFile() failure)
7000 Number of bytes read from serial port was less than expected
8000 Checksum fault in the received data

Codes for UploadMain() error:

3 H8 Flash could not be erased
10 Could not send 'SN' or 'MR' or 'PM' to the controller
20 No answer from controller on 'SN' or 'MR' commando
1..9 Controller answered 'SNx', 'MRx' or 'PMx' where x = 1..9 (0 expected)
30 Reply from controller not recognized (SN0 or MR0 expected)
40 Could not read the reply from 'PM' from the serial port

Codes for SendProgram() errors:

100 Unknown controller type (HC5500 or JobCom)
200 Could not write a data-block to serial port
300 Answer from the controller not recognized as block acknowledge
400 Negative block acknowledge from the controller
500 Could not read block acknowledge from serial port
600 Could not send BLKEND to controller
700 Could not read answer on BLKEND from serial port
800 Controller gave illegal answer on BLKEND

Codes for SendProgramExternalFile() errors:

10000 Program file is too small
20000 Unknown controller type (HC5500 or JobCom)
30000 Could not write data-block to serial port
40000 Could not read block acknowledge from serial port
50000 Answer from the controller not recognized as block acknowledge
60000 Negative block acknowledge from the controller
70000 Could not send BLKEND to controller
80000 Could not read answer on BLKEND from serial port
90000 Controller gave illegal answer on BLKEND

4 - Software and Communication

Hardi HC Upgrade software error messages:

Message	Possible Error	Solution
Please select a Comport	Didn't select a Comport	See section "Software program for the controller"
No Hardi Unit found on ComX (Xbeing the selected comport number).	A: Didn't select correct comport, which is connected to Hardi Unit. B: No power on unit. C: Comport already in use.	A: See section "Software program for the controller" B: Make sure the device power cable is correctly installed. C: Make sure that the comport selected, isn't already in use by another program, in that case, close the other program.
Upload of main program failed, error code (20)	Forgot to turn off the HC6500/JobCom after boot Upload	HC6500: See section "HC6500 software upgrade". JobCom: See section "JobCom software upgrade".
Upload of main program failed, error code (2)	No software to upload found	See section "Software program for the controller".

Dump of data from HC6500 Controller

Configuration of HC6500 to dump data

Open the extended menu in the controller by doing following:

Switch OFF the Controller

Push and hold the "ESC" button on the Controller

Switch ON the Controller and release the "ESC" when the start up picture has disappeared



Select:

E.4 Data exchange COM port set up

Extended menu		
	E1	Language Sprog Sprache Langue
	E2	Unit Metric or US
	E3	Reserved
»	E4	Data exchange COM port set up
	E5	Optional sensors
	E6	Service interval
	E7	Total register Master reset
	E8	Settings
	E9	TWIN actuator setup
Setup of RS232 COM 1,2		
Equipment, baud rate, protocol		

Select:

E4.1 COM 1 setup

E4 Data exchange COM port set up		
»	E4.1	COM 1 setup
	E4.2	COM 2 setup
Setup communication for VRA/remote, printer, dump, print dump		

Select:

E4.1.1 Equipment type

E4.1 COM 1 Setup		
»	E4.1.1	Equipment type
	E4.1.2	Baud rate
	E4.1.3	Protocol select
Choices are VRA/remote, printer, dump, Print dump		

4 - Software and Communication

Select:

E4.1.1.3 Print & Dump

Push "ESC" to return to previous menu

Select:

E4.1.2 Baud rate

Select:

E4.1.2.1 9600 baud

Leave the extended menu by switching off the controller

E4.1.1 Equipment type		
	E4.1.1.1	Printer
	E4.1.1.2	Dump
o »	E4.1.1.3	Printer & Dump
	E4.1.1.4	VRA / remote
Select if you want to print to a 12 volt printer and data dump from the same COM		

E4.1 COM 1 Setup		
	E4.1.1	Equipment type
»	E4.1.2	Baud rate
	E4.1.3	Protocol select
Choices are VRA/remote, printer, dump, Print dump		

E4.1.2 Baud rate		
o »	E4.1.2.1	9600 baud
	E4.1.2.2	4800 baud
	E4.1.2.3	2400 baud
	E4.1.2.4	1200 baud
Fastest Baud rate		

Dump data from HC6500

Switch on the controller and open the normal menu by pushing the Menu button

Select:

5 Logbook

Main menu		
	1	Daily settings
	2	Setup
	3	Calibration
	4	Toolbox
»	5	Logbook
Data records of registers or configuration for print or dump		

Select:

5.1 Print

5 Logbook		
»	5.1	Print
	5.2	Data dump
Register and configuration can be printed to the 12 volt printer		

Select one of following options:

5.1.1 Print single register

5.1.2 Print all registers

5.1.3 Print configuration

5.1.4 Print PrimeFlow status

Push the Enter button to select which type of dump is desired. The data can be read in Hyper terminal

5.1 Print		
»	5.1.1	Print single register
	5.1.2	Print all registers
	5.1.3	Print configuration
	5.1.4	Print PrimeFlow status
A specific register is selected for a print		

Select:

5.2 Data dump

5 Logbook		
	5.1	Print
»	5.2	Data dump
Register and configuration can be dumped to a PC via e.g. Hyper Terminal		

Select one of following options:

5.2.1 Data dump of raw data

5.2.2 Hyper terminal service report

Push the Enter button to select which type of dump is desired. The data can be read in Hyper terminal

5.2 Data dump		
»	5.2.1	Data dump of raw data
	5.2.2	Hyper terminal service report
Transmit data from all 99 registers in comma-separated file for Excel		

4 - Software and Communication

Configuration of HyperTerminal

It is possible to transmit and receive data to and from the HC5500/6500 through the com port on the controller and the computer.

Use HyperTerminal on the PC to transmit or receive data from the Controller.

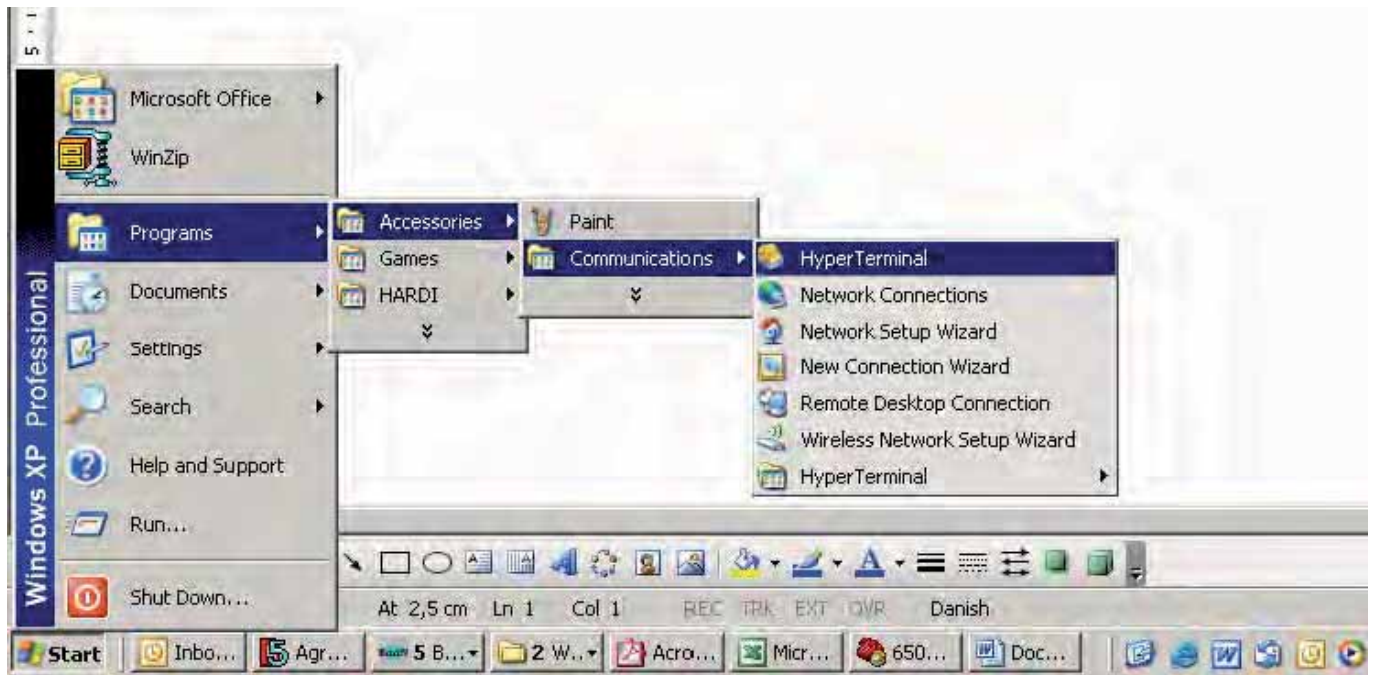
The connection from the PC to the controller is made with HARDI cable P/N 72271600. The cable has a short circuit in one of the connector, normally where the label, "Hardware halt" is. This connector should be connected to the PC when transferring data.

The data read in HyperTerminal can be exported to a spreadsheet or a word processing, see section "Handling the data".

Configuration of the HyperTerminal:

Baud rate	9600
Data bit	8
Parity	None
Stop bit	1
Flow control	Hardware
Emulation	ANSI

The HyperTerminal is normally installed in the "Start" menu in Windows:



Open HyperTerminal and enter a name

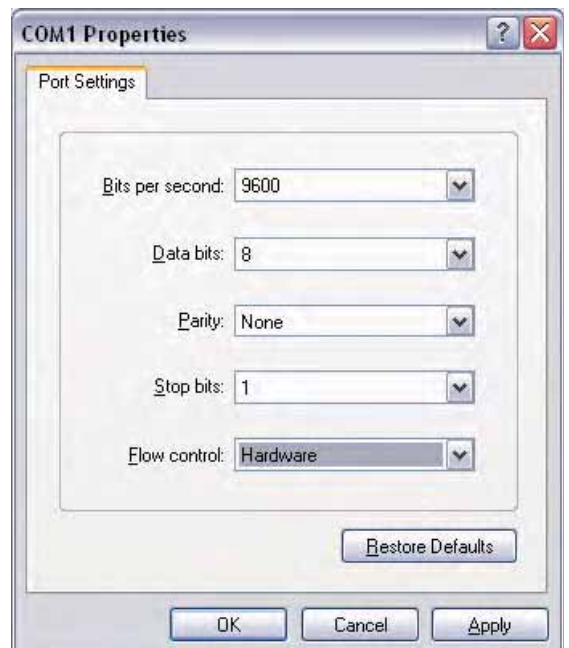


4 - Software and Communication

Select COM1 or another available COM port on the PC

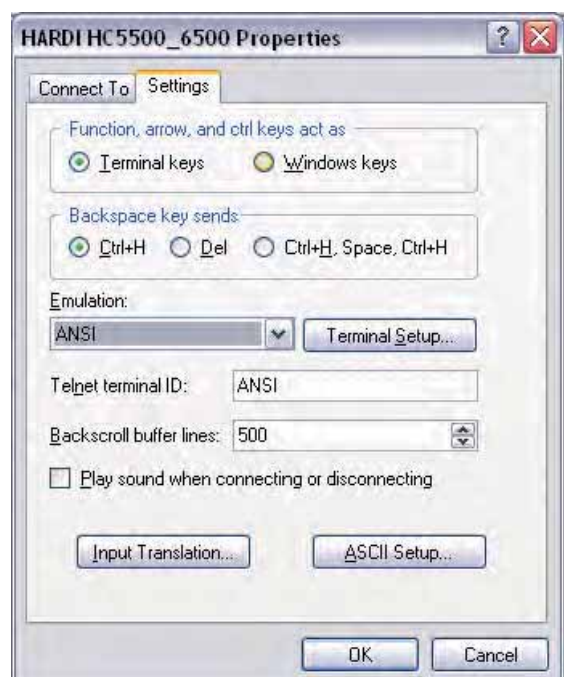


Add the port setting data and select "Apply" and "OK".



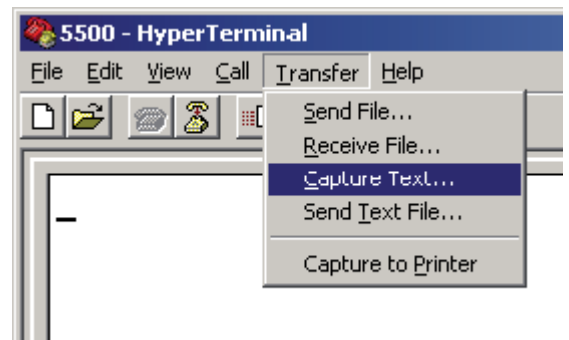
To set up the Emulation select in the HyperTerminal File menu:

Properties and then Settings



4 - Software and Communication

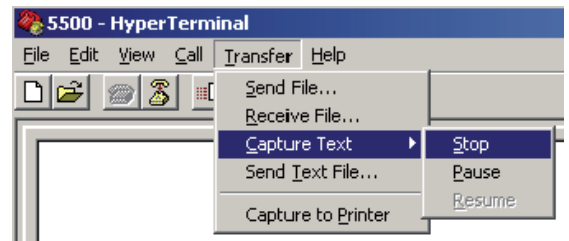
If the data should be saved in a file the "Capture Text" need to be activated



When the "Capture Text" is activated select a place to save the file



When the controller is finished to transmit data select "Stop" or "Pause" in the menu

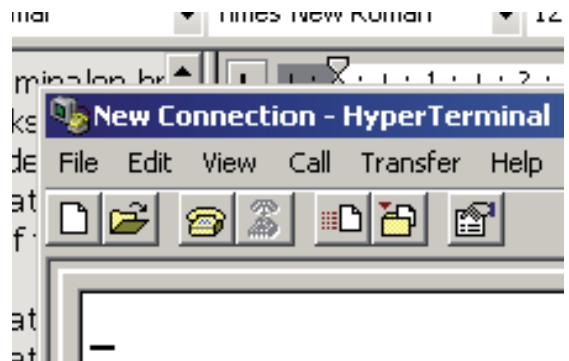


If the terminal is open with wrong settings do following:

The terminal can be connected or disconnected. It is not possible to change settings in the Connection and Port settings if the terminal is connected.

Push the "phone" button to connect/disconnect.

To change settings, push the "Properties" button in the menu.



Handling data from HyperTerminal

The dumped data can be used in different ways. If the data is used for analyze later on, the data must be saved. If not necessary to save the data, the data will be shown on the PC screen and lost when the file is closed.

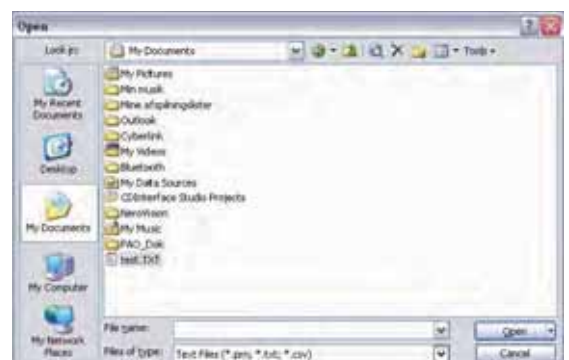
If the dumped data is to be opened with a spreadsheet after the transfer, the data must be saved on the PC. The data is saved as a Notepad data file. These files can also be opened in a spreadsheet (e.g. Excel) but it has to be done the right way.

Open the data file in Excel

Open Excel and select "Open" file.

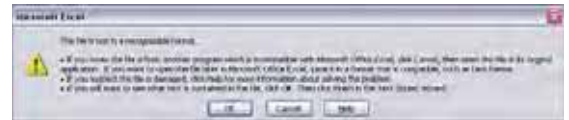
Select "Files of type *.txt.".

Select the file to open, e.g. Test.TXT.



4 - Software and Communication

Select OK in this warning window.



Select "Delimited" as data type in the next window.



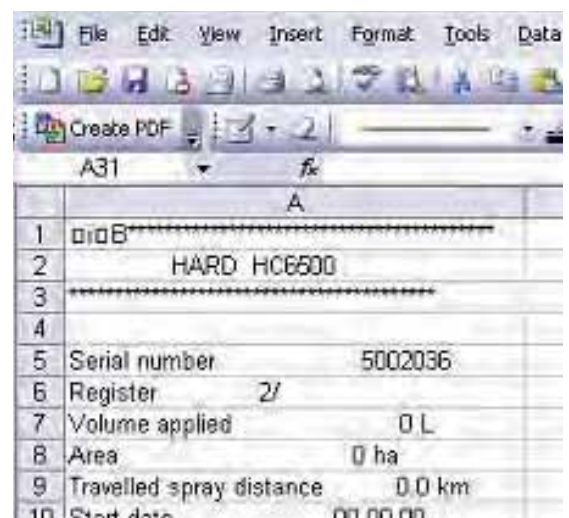
Mark "Other:" with an "|" (press Alt+124).



Select "Finish"



And Excel will open the file:



General info/description

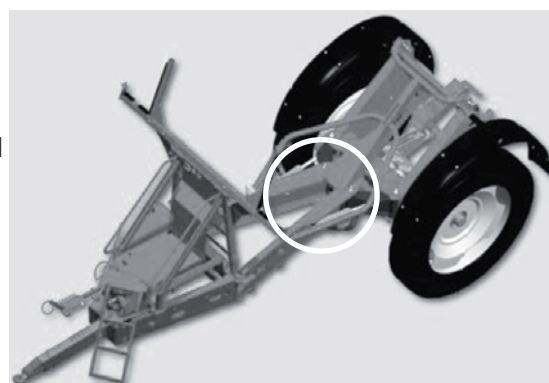
SafeTrack

The SafeTrack is available as an option on the new COMMANDER. With HARDI SafeTrack you do not have to choose between a tighter turning radius or better stability.

SafeTrack has two trapeze arms placed between the main chassis and the rear axle of the sprayer, when changing the angling of the trapeze arms the rear axle angle to the side.

The unique geometry in the SafeTrack concept, with trapeze arms, gives a turning radius down to 6 metres.

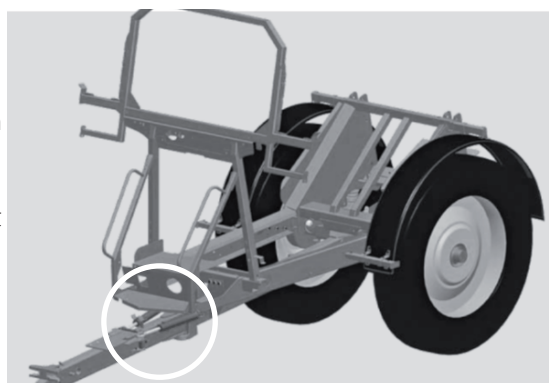
In transport mode, the SafeTrack function automatically locks in straight ahead position. The track and boom sensors sense which mode the sprayer are in and prevent the driver to drive with the boom folded and an open track lock.



IntelliTrack

The IntelliTrack is available as an option on the Navigator. IntelliTrack is a high end steering drawbar concept which combines the advantages of an excellent designed chassis with the use of advanced electronics. With IntelliTrack is the drawbar divided in two - a rear part fixed on the frame and a moveable front part.

Dynamic Electronic Control is an integrated safety feature which doesn't allow the cylinders to steer the drawbar when the driving speed is too high for the given track width. IntelliTrack has automatic drawbar transport lock and 6 metre turning radius



SafeTrack and IntelliTrack can be set to a minimum radius which activates "soft stops" at the hydraulic cylinders. This is to ensure smooth operation of the machine when reaching the hydraulic cylinder end stop.

Sensors involved

Front angle sensor at drawbar	70 Deg. Connected to JobCom
Rear angle sensor rear under machine	120 Deg. Connected to track wireharness under machine
Boom fold sensor at boom swivel	Connected to hydraulic harness
Lock sensor under machine	Connected at junction box under machine
Speed sensor	Connected to section valve PCB

Constants involved

Speed	Drawbar length	Minimum radius
Track With	Tractor drawbar length	Maximum speed
Chassis size	Safety Factor	Calibration of proportional hydraulics

Pinning/plugs/colors/codes:

	Pot. meter	Sensor	AMP pin	PCB
Black	GND	GND	1	-
Blue	Signal	Signal	3	Track
Brown	+12V	+12V	2	+

Fault finding options/results

Check power supply and hydraulic supply; follow instructions in Operators Instruction Book.

5 - Track

Measurements

In menu 4.7 sensor readouts can be seen.

Be careful as all automatic functions are disabled.

Do not try to operate before checking that the boom is clear from the transport brackets and the SafeTrack lock under the machine is open.

When machine are straight the potentiometers must show 2.5 Volt

Inductive sensors show 0.8 V or 5.0 V

Track setup

Enable track

Enable track in menu E8.4.01


The track system is default disabled. After a master reset of the controller the track system has to be enabled.

E8.4.1 Track disable/enable		
	E8.4.1.1	Track disable
Ⓡ	» E8.4.1.2	Track enable
Track is enabled		
Safety system enabled		

Chassis setup

To have the track system to track properly the correct chassis has to be selected in menu E8.4.3

When the chassis is selected, the default value of menu E8.4.8 Minimum radius is also changed.



Note: If you go in menu E8.4.3 to check the chassis setting, a key press "Enter" will cause the extended menu settings for that chassis reverting to default. Safety factors and gain values then have to be set again.

E8.4.3 Chassis		
	E8.4.3.1	CM05 Small
Ⓡ	» E8.4.3.2	CM05 Medium
	E8.4.3.3	CM05 Large
	E8.4.3.4	NAV07 Medium
Select for the 4400 liter chassis CM		
2005 version		

Front sensor adjustment for SafeTrack and IntelliTrack

Verify that the potentiometer is adjusted to its centre position.

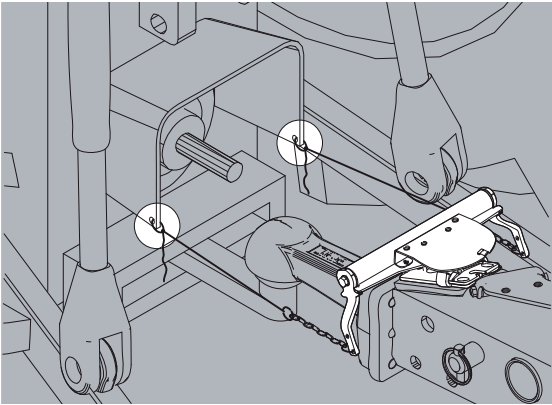
If necessary the potentiometer is adjusted by loosening the two retaining screws and turn the potentiometer housing.

Ensure the lever remains seated and secure once the screws are retightened.

The screws are accessible through the two holes in the protective cover.

The chains attached to the tractor must be parallel to each other and fairly horizontal, perpendicular to the angle sensor shaft.

If not the sensor input is not a precise mirror of the actual turning angle.



When the sprayer and drawbar is aligned should the front and rear potentiometer physically be adjusted to read out the default voltage and degrees on the controller.

The values can be read out in menu 4.5.4.6 Track sensor test and for the rear sensor also in menu E8.4.2.1.

When the sprayer and drawbar is aligned and set the sensor voltage should read 2.5 V +/- 0.1 V, 0.0 degree.

4.5.4.6 Track sensor test		
Front sensor	2.50	Volt
Front sensor	0.0	degree
Rear sensor	2.50	Volt
Rear sensor	0.0	degree
Boom sensor 1	0.7	Volt
Boom sensor 1	unfold	
Boom sensor 2	0.00	Volt
Lock sensor	5.00	Volt
Lock sensor	Unlockd	
Actual sensor signals		
Under 0.5 volt means not connected		

Voltage and angle read out in menu E.8.4.2.1

Right and Left gain value is the actual gain settings.

The default value is 1.00.

Raw sensor and angle reading is the actual reading from the rear potmeter.

Corr. sensor and angle reading is the actual value the controller is using when turning left or right.

With default gain vaule, 1.00, will the Raw and Corr. value be the same.

When the gain is increased will the Corr. value be higher than the Raw value.

When the gain is decreased will the Corr. value be lower than the Raw value.

E8.4.2.1 Read out		
Right gain value	1.00	
Left gain value	1.00	
Raw sensor reading	2.50	Volt
Raw angle reading	0.0	degree
Corr. sensor reading	2.50	Volt
Corr. angle reading	0.0	degree
Actual gain setting and sensor reading		

IntelliTrack drawbar alignment

Use the protractor, ref. no. 72547300 to adjust the drawbar angle to 0 degrees or measure the lenght of the two cylinder pistons.

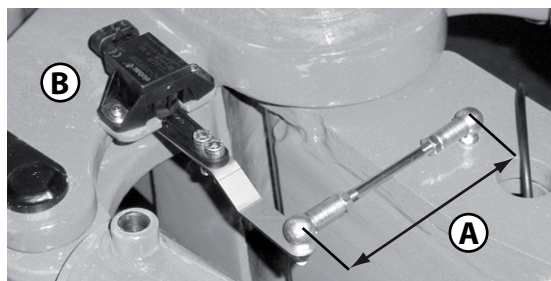
The sprayer drawbar is aligned when the two cylinder pistons have the same length +/- 2mm.



IntelliTrack rear sensor adjustment

Adjust the link from the potentiometer arm to the chassis to 115mm **A**.

Adjust the potentiometer by loosening the two retaining screws **B** and turn the potentiometer housing until it read out 2,5V/0 degree on the controller.

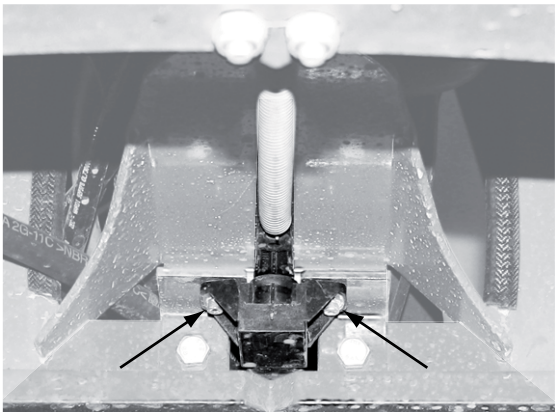


5 - Track

SafeTrack rear sensor adjustment

Align the sprayer and place a 16-17mm bolt in the calibrating hole on the lock.

Adjust the potentiometer by loosening the two retaining screws and turn the potentiometer housing until it read out 2,5V/0 degree on the controller.

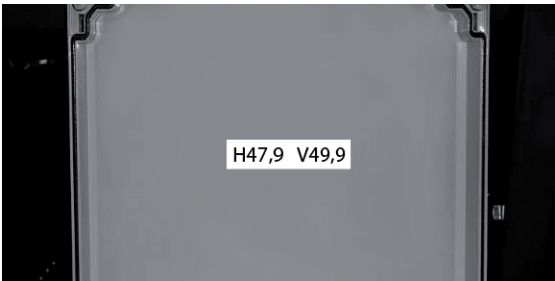


IntelliTrack rear sensor calibration:

To compensate for that the production tolerance of the sprayer has influence on the IntelliTrack track performance is it possible to calibrate the gain to match the actual maximum turning angle.

At the factory the maximum left and right turning angle of the drawbar is measured and a sticker with the angel is placed inside the JobCom lid. If the sticker with the angel is on the lid is it not necessary to do the measurements with the protractor; the value can be keyed in direct in menu E8.4.2.2.2 and E8.4.2.2.4.

H=right, L=left



i NOTE! In case of master reset the calibrations procedure must be done again.

Open menu E.8.4.2.2.2 to calibrate the rear angle sensor.

E8.4.2.2.2 Calibrate

E8.4.2 Rear angle sensor	
E8.4.2.1	Read out
» E8.4.2.2	Calibration
E8.4.2.3	-->
E8.4.2.4	<--
Calibration of rear angle sensor	

Turn the drawbar to extreme right

E8.4.2.2.1 Raw angle reading

auto ✓ Track auto 04
E8.4.2.1 Raw angle reading
XX.X
degree
Press and hold "steer to right" button, until end stop is reached. Press ENTER.

Use the protractor, (72547300), to measure the maximum right angle

Key in the measured angle value or the value from the JobCom lid.

E8.4.2.2.2 Raw angle reading



auto	✓	Track	auto			04
E8.4.2.2.2 Raw angle reading						
47.9						
degree						
Keyin physical measured angle. Press ENTER.						

Turn the drawbar to extreme left

E8.4.2.2.3 Raw angle reading

auto	✓	Track	auto			04
E8.4.2.2.3 Raw angle reading						
XX.X						
degree						
Press and hold "steer to left" button, until end stop is reached. Press ENTER.						

Use the protractor, (72547300), to measure the maximum left angle

Key in the measured angle value or the value from the JobCom lid.

E8.4.2.2.4 Raw angle reading



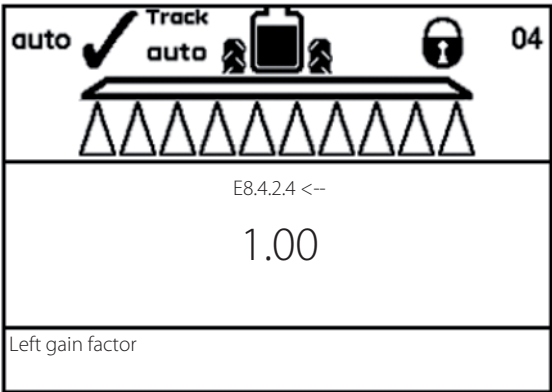
auto	✓	Track	auto			04
E8.4.2.2.4 Raw angle reading						
49.9						
degree						
Keyin physical measured angle. Press ENTER.						


5 - Track

Trimming SafeTrack or IntelliTrack accuracy

Even with thoroughly calibrated systems, some sprayers do not obtain sufficient track precision. This can be caused by that the tractor has a longer drawbar, than the system was designed for and the angle sensors, front and rear, both have their tolerances summed in performance-negative direction.

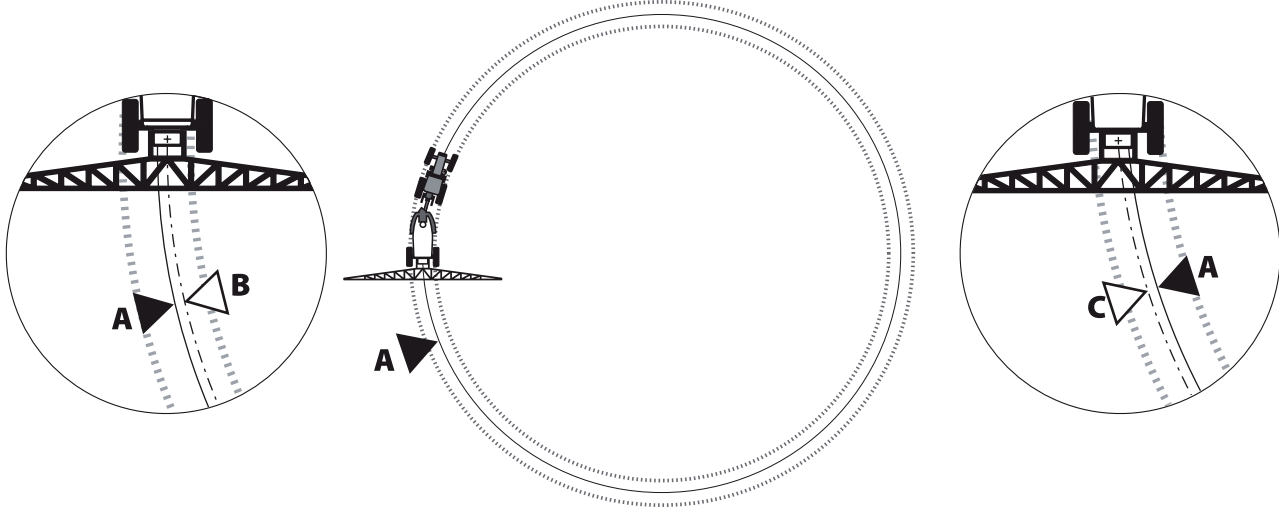
In menu E8.4.2.3 and E8.4.2.4 left and right gain factor can be set manually.



 Proper speed calibration and sensor adjustment are essential to both track systems


Instruction:

Make sure the track system has been properly calibrated, including the speed.
Set track mode button to "auto".
On a flat field drive in a circle about 1m bigger than minimum radius for that sprayer; see table. Hold the steering wheel steady. Forward speed about 5-7 Km/h. Check the deviation between the sprayer and tractor.
If the sprayer over-compensates, sprayer outside tractor, C on picture, increase the gain factor, 1.0 -> 1.1.
If the sprayer under-compensates, radius smaller than the tractor, B on picture, decrease the gain factor, 1.0 -> 0.9.



Drive a full circle again, and check. Decrease or increase the gain factors accordingly.

 Note: Some farmers prefer a fast tramline-in - tramline-out reaction - and might be able to live with some overcompensation in the curve.

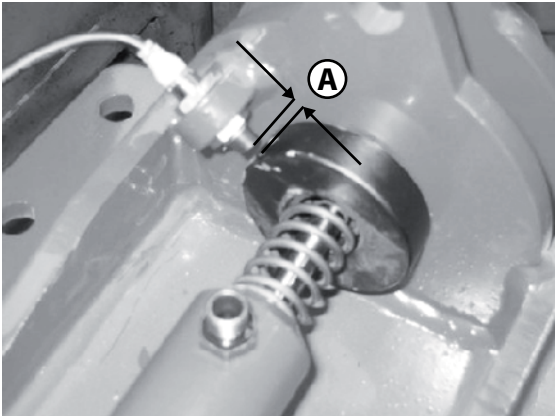
 Note: If you go in menu E8.4.3 to check the chassis setting, a key press "Enter" will cause the extended menu settings for that chassis reverting to default. Safety factors and gain values then have to be set again.

 Turning radius:

Commander	3200	4400	6600
Turning radius SafeTrack, meter	6.00	6.20	9.00
NAVIGATOR	3000	4000	
Turning radius IntelliTrack, meter	6.0	6.0	

Trapeze lock sensor adjustment

The trapeze lock sensor air gap "A" should be between 3 and 6mm.



Verify the Lock sensor function in menu 4.5.6 Track sensor test.

The Lock sensor voltage should be 0.5V when locked and 5V unlocked.

4.5.4,6 Track sensor test		
Front sensor	2.50	Volt
Front sensor	0.0	degree
Rear sensor	2.50	Volt
Rear sensor	0.0	degree
Boom sensor 1	0.7	Volt
Boom sensor 1	unfold	
Boom sensor 2	0.00	Volt
Lock sensor	0.50	Volt
Lock sensor	Locked	
Actual sensor signals		
Under 0.5 volt means not connected		

Drawbar length

Menu E8.4.4 Sprayer drawbar length.

Value 0-200cm

Default value 100cm, 40 inches

Commancer 05

Drawbar length is measured from the drawbar pin hole to the middle of the first bolt that holds the drawbar on the sprayer.

Navigator

Drawbar length is measured from the drawbar pin hole to the rear bolt on the pump base.

<div> <div> <div>auto</div> <div>✓</div> <div>Track</div> <div>auto</div> <div> <div></div> <div></div> </div> <div>04</div> </div> </div>
<div>E8.4.4 Sprayer drawbar length</div> <div>100</div> <div>cm</div>
<div>Key in lenght from drawbar eye to anchor bolt on sprayer drawbar</div>

Manual angling speed

Menu E8.4.5 Manual angling speed

Value -9% to 9%

Default value 0%

Note +/- can be changed by toggling

Sets the manual steering speed.

Unfold boom, set PTO to spraying RPM, and set the system to "Manual".

By using the L/R button the sprayer will start moving. If too slow increase the value. If too fast decrease the value.

<div> <div> <div>auto</div> <div>✓</div> <div>Track</div> <div>auto</div> <div> <div></div> <div></div> </div> <div>04</div> </div> </div>
<div>E8.4.5 Manual angling speed</div> <div>0</div> <div>%</div>
<div>Use a minus value to slow hydraulic speed positive value to increase speed</div>

5 - Track

Boom fold sensor

Menu 8.4.6 Boom fold sensor

Number of boom fold sensors present

LPZ, HAZ, HPZ, FTZ use one sensor

SPC, SPZ use two sensors

Only one boom sensor for simultaneous folding inner section

Two boom sensors for individual folding inner sections

CM05: 0 is possible but invalid selection

Navigator: 2 is possible but invalid selection

Menu 8.4.6 Boom fold sensor

E8.4.6.1	No boom sensors
E8.4.6.2	1 Boom sensor
E8.4.6.3	2 Boom sensors

On NAV07 boom sensor are optional

Error print for overspeed

Menu 8.4.7 Error print for overspeed

Prints last 3 hazardous situations where over-speeding alarm was active

The picture to right shows the first track alarm.

From the print the date and time and sprayer data settings can be read out.

The "Track Dataset no" show the actual speed and track radius the next 10 sec.

The example shows an alarm at a driving speed 4.8 km/h and a track radius of 13.5m. This is approximately half turning radius.

When the alarm occurs the sprayer aligns automatically to a track radius of 25.1m. The speed log is showing that the speed is decreasing the next seconds.

Safety factor log

Every time the user presses "Enter" in menu E8.4.10 Safety factor, a log is created with setting, and date.

10 latest changes are logged.

The log is printed out with the error print menu E8.4.7.

TrackAlarm Nr	1	
Date	29.04.10	
Time	15:40	
Tank contents	0 L	
Speed PPU	5.710 PPU	
Track width	183 cm	
Dead zone	10 cm	
Damping	50%	
Alignment offset	- 0 cm	
Sensitivity	24 25 65 63 %	
Chassis	CM05 L	
Manual angling	0%	
Minimum radius	9,0 m	
Track Dataset no	Speed	Track Radius
1	4.8 km/h	13.5 m
2	4.6 km/h	25.1 m
3	4.2 km/h	25.1 m
4	3.8 km/h	25.1 m
5	3.6 km/h	25.1 m
6	3.4 km/h	25.1 m
7	3.4 km/h	25.1 m
8	3.2 km/h	25.1 m
9	3.2 km/h	25.1 m
10	2.6 km/h	25.1 m

TrackAlarm Nr 2
Same data as in TrackAlarm Nr 1

TrackAlarm Nr 3
Same data as in TrackAlarm Nr 1

Safety factor log		
1	29.04.10	90
2	29.04.10	80
3	29.04.10	90
4	14.09.09	120
5	14.09.09	130
6	14.09.09	100
7	01.06.08	110
8	01.06.08	120
9	01.06.08	110
10	19.01.08	100


Minimum turning radius

E8.4.8 Minimum radius permitted

Default value for CM05 3200L: 6.5m, 4400L 7.0m, 6600L: 9.0m

Default value for Navigator: 6.0m

Increase to achieve a soft-stop, prevent bottoming out, on track cylinders.


<p>E8.4.8 Minimum radius permitted</p> <p>6.0</p> <p>meter</p>
<p>Minimum permitted radius.</p> <p>Will set soft stop for cylinders</p>

Maximum turning speed

If maximum turning speed is exceeded is the track system aligning the sprayer and a speed alarm will be present in the display.

<p>E8.4.9 Maximum speed when turning</p> <p>18</p> <p>km/h</p>
<p>Above set speed, no angling is possible.</p> <p>Default is 18km/h or 11 mph</p>

Safety factor

When using a track system, sprayer stability is a common concern. Many factors influence the sprayer, and conditions where the sprayer might tip over have to be dealt with, some are sprayer specific and others are user specific.

The sprayer specific factors are: Angular speed, track width, tank size, tank level and sprayer geometry. These factors are collected and calculated to a "Safety factor" that defines a safe or unsafe driving situation for the sprayer.

User specific: Driving behaviour, tire width, tire pressure and field conditions. The user factors are not consider in the Safety factor calculations.

An alarm will be present in the display, when an unsafe driving situation is present: "Over speeding!", "Slow down!".

A sound alarm is also present - disregarding any setting of sound level in general.

E8.4.10 Safety factor for SafeTrack

Default value for CM chassis Small: 90%

Default value for CM chassis Medium: 100%

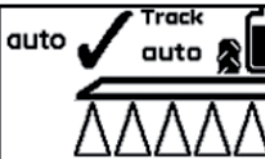
Default value for CM chassis Large: 120%

Default value for NAV 07 chassis Medium: 100 %

0 disables the build in safety system.

Raising the value increase captiousness.

Use steps of 10% as a guide to changes.

	<p>E8.4.10 Safety factor for SafeTrack</p> <p>100</p> <p>%</p>
<p>Changes point of hazardous situation. Increase if hilly, lower if SafeTrack</p>	

Every time the user presses "Enter" in this menu, a log is created with setting, and date. 10 latest changes are logged. The log is printed out with the error print menu E8.4.7.

5 - Track

Half steer

E8.4.11 Half steer

Default: Disable

Only sprayers with SafeTrack. Requirer left and right boom sensors.

E8.4.11 Half steer

E8.4.11.1 Disable

E8.4.11.2 Enable

Disables option for Eagle (SPC) boom to steer to one side while the opposite side is folded

Track Alerts, fault finding

See HC6500 Instruction book Fault finding chapter for a full table of Alarms, Warnings etc that will or can be shown on the terminal display.

Fault	Problem cause	Control / Remedy
No lock release when hydraulic pressure is established, and the controller is powered up	Hydraulic pressure hoses P and T are turned around.	Turn hydraulic pressure hoses around. T= Blue, P=red
Rear angle sensor alarm	In menu 4.7 the rear angle sensor will read app. 0,00V	Check 10A fuse on DAH PCB in the JobCom
Unable to lock SafeTrack	The rear angle sensor possible need adjustment	A 16-17 mm bolt is placed in the calibrating hole on the lock. Then the rear angle sensor is adjusted to 2.50 Volt.

General info/description

LookAhead is a system which ensures the pressure regulation motor to be in the correct position even though the nozzles are not spraying. If the flow is under the minimum limit for the flow meter it changes to pressure based regulation if a pressure transducer is fitted.

PTO revolutions must be constant when using LookAhead. Calibration must be done at the same R.P.M. as when spraying.

To indicate the system is active, pressure regulation winds down and up during start up. System is disabled when boom is folded.

Sensors involved

Speed sensor

Flow sensor

Pressure regulation position sensor

Boom unfold sensor

Pressure transducer if fitted

Constants involved

Speed	PWM (Ext menu)
Flow	Reg. constant (Ext menu)
Boom	sections/width

Check flow meter calibration

Diameter 13mm	approx. 120 PPU	One outside groove
Diameter 20mm	approx. 60 PPU	No groove
Diameter 36mm	approx. 17 PPU	Two outside grooves

Pinning/plugs/colors/codes

Pressure regulation valve

Function	Positions		Color
SGND	-	J2	Black
SIG	Reg fb	J2	Blue
+12V sensor	+	J2	Brown
+12V power	Reg +	J3	Brown
GND	Reg -	J3	Blue

Measurements

Pressure regulation valve

Peak load Max 0.6 amp.

Normal load Max 0.4 amp

Signal is in Hz.

General info/description

To improve non equal pressure systems such as EFC, PrimeFlow, EVC with closed equal pressure ports, is it as an option possible to equip the system to switch from flow to pressure based regulation. The system switch automatically when the flow drops below the minimum flow rate selected in the controller.

The drop of flow can be due to how many sections are selected for the boom and how many nozzles there are in each section. If there are few or only one nozzle in the last section of the boom and the sprayer is spraying in a angle and only the last section is open there is almost no flow in the liquid system and it will close down.

It will be the same if the sprayer is fitted with a large flow house, then the flow meter will measure almost no flow with small boom sections or nozzles with low output (L/min).


With the sensor installed the liquid system will switch to pressure based regulation instead.

To switch from flow to pressure based regulation a pressure sensor needs to be installed. The sensor is mounted in the liquid system on the boom and connected to the PCB in the distribution valve junction box on the rear of the sprayer.

For mounting and setup of the sensor pleas read the "Sensor" chapter in this book, page 83.

Boot sequence

When the pressure sensor is active will the HC6500 prompt for a nozzle choice. The last used nozzle is designated by the (R) symbol at the line of the nozzle description in the display.

If the nozzle and application rate used at last spray job is going to be re-used, then press  and the work screen will appear.

If not; select another nozzle and press  and the minimum pressure screen will appear.

1.6 LookAhead nozzle select		
(R)	» 1.6.06	Blue ISO 03
	1.6.07	Red ISO 04
	1.6.08	Brown ISO 05
	1.6.09	Grey ISO 06
	1.6.10	White ISO 08
	1.6.11	Light blue ISO 10
	1.6.12	Light green ISO 15
	1.6.13	Custom 1
	1.6.14	Custom 2
Select nozzle for ISO 03 for 1,2 l/min. at 3 bar		


Minimum pressure

In menu E8.1.3 is the minimum allowed pressure typed in. In practice, this means the regulation valve will stop if the pressure goes below this value.

The regulation valve will stop to move but the pressure may drop below the specified minimum pressure.


Recommended minimum pressuer is around 1 bar or higher than non-drip valve pressure.


auto




Track

auto





04



E8.1.3 Minimum pressure

0.0

Bar

Pressuer where regulation valve starts.
Needs a pressure sensor.

General info/description

When AutoFill is started the agitation will automatically go to no agitation.
If the "0 agitation" key is pressed for 2 sec, the AutoAgitation will be disabled.
AutoAgitation then has to be setup in menu 2.2.6
If rinse tank is not completely full, the system will show "Rinse tank not full" when filling is completed.

Sensors involved

Potentiometer inside motor housing of filling valve
Main tank full sensor
Tank content sensor (Tank Gauge)
Agitation position sensor

Constants involved

Tank gauge calibration

Pinning/plugs/colors/codes

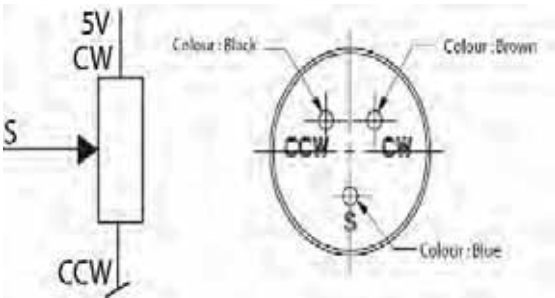
Electrical filling valve:

Function	Positions		Color
SGND	-	J1	Black
SIG	Fill. val. fb	J1	Blue
+12V sensor	+	J1	Brown
+12V power	Filler +	J3	Brown
GND	Filler -	J3	Blue

Tank gauge sensor

Function	Positions		Color
SGND	-	J1	Black
SIG (Hz)	Tank gauge	J1	Blue
+12V sensor	+	J1	Brown

Cable connection to potentiometer:



Fault finding options/results

Electrical filling valve

When 12 Volt is applied to the brown wire and ground to the blue wire, the valve will turn clockwise when looking through the threaded connecting opposite the motor housing

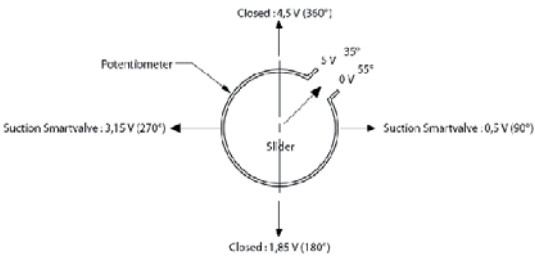
8 - AutoFill

Measurements

Menu 4.5.4.5 motor suction valve

Open to suction smart valve at 0.5 V

Closed 1.8 V

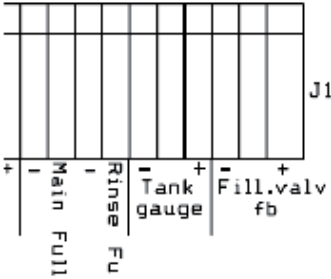


Tank full sensors Main & Rinse tank

The tank full sensors in the tanks read:

Sensor status:	Ohm:	Menu 4.5.4.3:
Open	OL	0
Closed (Full tank)	1	1

Connection at J1 to Jobcom ver. 2.1



General info/description

A potentiometer on PARALIFT measures boom height. A potentiometer on pendulum will measure slant angle. The system will lift the boom when turning at headland and can be set to mirror slant angle at the same time.

At startup or when folding, the system enters manual mode (state 1, ON or OFF). The system remains in this state until the nozzles are opened. When the nozzles are opened, it enters state 2. From this state the user can either enter AUTO ON (state 3) or MANUAL OFF (state 1). If the pendulum is locked, an alarm is displayed when spraying is commenced.

If the boom is operated manually while HeadlandAssist is in the process of moving it, the system immediately jumps to MANUAL mode.

Sensors involved

Potentiometer on Paralift 120 Deg. connected to hydraulic harness

Slant potentiometer on Pendulum 30 Deg. connected to JobCom J2

Speed sensor

Constants involved

Delay from tractor (reference point) to boom on sprayer

Height to raise boom when turning

Speed constant

Pinning/plugs/colors/codes

Function	Positions	Color
SGND-	J2	Black
SIG (height)	J2	Blue
+12V sensor	J2	Brown

Fault finding options/results

Check that boom reacts correctly to control box buttons (manual), up/down and slant right/left. The reaction on the boom should be to the same position as the switch.

Measurements


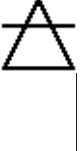













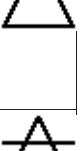












Check menu 4.5.4.4

Turn slant potentiometer to the sprayer's right side, reading is 3.6 to 4V.

























Turn height potentiometer to the up, reading is 3.6 to 4V.

9 - HeadlandAssist

<p>A: Headland B: Raise boom & adjust slant C: Lower boom & adjust slant D: Manual adjust of boom E: Headland Assist Delay F: Vegetation line</p>			
State	State Icon	Nozzle Icon	
1 When folded it is assumed that the sprayer has just arrived in the field and therefore has not or has just been powered up (booted).			
2 After unfolding the boom no spraying height has yet been recorded and AUTO mode isn't possible yet.			
3 When the nozzles are opened for the first time the system changes from MANUAL OFF to MANUAL ON. The boom height is already or is now in the process of being adjusted by the operator.			
4 Now AUTO at the HeadlandAssist icon can be pressed. Manual control of the boom is still possible at this point.			
5 In the event of an obstacle - known or suddenly appearing - the set delay can be overridden by a long press on the OFF button.			
6 After clearing the obstacle the boom is readjusted, the operator presses ON and starts moving. As the machine is in MANUAL the nozzles open immediately.			
7 Now AUTO is pressed and spraying continues normally.			
8 When pressing OFF HeadlandAssist is activated. The machine continues with normal pressure regulation through the predefined delay.			
9 When the HeadlandAssist delay has been travelled, the nozzles close, the spraying height and slant angle is registered and the boom is lifted and the slant is centred as simultaneously as possible. From the moment the nozzles close, LookAhead takes over the positioning of the regulation valve.			

10	When pressing ON the lowering of the boom and the mirroring of the slant angle is initiated as simultaneously as possible. The distance driven starts counting up to the set HeadlandAssist delay. LookAhead still controls pressure regulation.		
11	When the HeadlandAssist delay is driven the nozzles are opened. Until the regulation delay has expired, LookAhead controls the regulation valve.		
12	If OFF is pressed by accident and it is detected by the operator before the HeadlandAssist delay has expired.....		
13the operator can press ON and spraying is resumed without incident. The driven distance under the HeadlandAssist delay must be reset so the nozzles don't close to soon next time OFF is pressed.		
14	During spraying the operator can adjust boom height and slant angle. This doesn't affect the AUTO mode.		
15	After pressing OFF and before the nozzles close the operator adjusts boom height and slant angle. This doesn't affect the AUTO mode as the boom height and slant angle are not registered until at step 16 when the nozzles close.		
17	During turning in the headland the operator adjusts boom height and slant angle. This doesn't affect the AUTO mode. Likewise the operator can stop the sprayer to take a break without interfering with the AUTO mode.		
18	When pressing ON the boom is moved to the last registered spraying height. The slant angle of the boom in step 16 is used to calculate the new slant angle regardless of the corrections made in step 17.		
22	If ON is pressed unintentionally, the boom will begin moving to the last registered spraying height and mirror the last registered slant angle immediately.		
23	Before the expiry of the HeadlandAssist delay OFF is pressed which causes the system to stop the boom immediately and return to MANUAL mode with the nozzles closed. An audible and visual alarm is given to the operator.		
24	The nozzles are opened by pressing ON. As the system is in MANUAL mode, the nozzles open immediately. LookAhead controls the regulation valve until the expiry of the regulation delay. After pressing ON the operator can switch to AUTO mode.		
26	At the end of the last tramline the sprayer is stopped which causes the system to enter MANUAL mode. OFF is pressed and the nozzles close immediately. The operator manoeuvres the sprayer to the end of the headland in order to spray this last part of the field.		
27	The operator lowers the boom manually, presses ON and commences forward driving.		
28	When the operator stops at the far end of the headland no warning is given as the system was in MANUAL mode.		

9 - HeadlandAssist

	STATE 1 to 4 when spraying									
STATE	1		2		3		3B		4	
ICON DISPLAYED										
ACTION TAKEN	HeadlandAssist MANUEL NOZZLES OFF		HeadlandAssist MANUEL NOZZLES ON		HeadlandAssist AUTO NOZZLES ON		FINISH BOOM MOVEMENT AUTO ON		WAIT DELAY	
NO INPUT	No action		No action		No action		Open nozzles Finish boom movement. Goto state #3		When delay is expired, read spraying height and slant angle. Close nozzles. Goto state #5.	
PRESS ON/OFF	Goto state #2		Goto state #1		Goto state #4		Stop boom movement. Goto state #4		Reset delay. Goto state #3	
PRESS AUTO	ILLEGAL! No action.		Goto state #3		Goto state #2		Goto state #2		Goto state #2	
MANUEL CONTROL OF LIFT OR SLANT	Move boom accordingly		Move boom accordingly		Move boom accordingly		WARNING! Move boom accordingly. Goto state #2		Move boom accordingly	
LONG PRESS ON/OFF	Goto state #2		Goto state #1		Goto state #1		Stop boom movement. Goto state #1		Goto state #1	
SLOW DOWN BELOW LIMIT	No action		No action		Goto state #2		Goto state #2		WARNING! Goto state #2	
FOLD BOOM	Move boom accordingly		Move boom accordingly		Move boom accordingly. Goto state #2		WARNING! Move boom accordingly. Goto state #2		WARNING! Move boom accordingly. Goto state #2	
OPERATE SMARTVALVES	Move valves accordingly		Move valves accordingly		Move valves accordingly. Goto state #2		Move valves accordingly. Goto state #2		Move valves accordingly. Goto state #2	
CENTER SLANT	Move boom accordingly 		Move boom accordingly 		Move boom accordingly 		WARNING! Goto state #2		Move boom accordingly 	
	STATE 5 to 8 in headland									
STATE	5		6		7		8			
ICON DISPLAYED										
ACTION TAKEN	MOVE BOOM TO TURNING HEIGHT		MOVE BOOM TO SPRAYING HEIGHT		WAIT REMAINING DELAY		AUTO OFF			
NO INPUT	When desired height is reached and slant is centered goto state #8.		If delay expires goto state #3b. When desired spraying height and slant angle is reached goto state #7.		When delay is expired open nozzles. Goto state #3.		No action.			
PRESS ON/OFF	WARNING! Goto state #1		WARNING! Goto state #1		WARNING! Goto state #1		Goto state #6			
PRESS AUTO	Stop boom movement. Goto state #1		Stop boom movement. Goto state #1		Goto state #1		Goto state #1			
MANUEL CONTROL OF LIFT OR SLANT	WARNING! Move boom accordingly. Goto state #1.		WARNING! Move boom accordingly. Goto state #1.		Move boom accordingly		Move boom accordingly			
LONG PRESS ON/OFF	Stop boom movement. Goto state #1		Stop boom movement. Goto state #1		Goto state #1		Goto state #1			
SLOW DOWN BELOW LIMIT	No action		No action		No action		No action			
FOLD BOOM	WARNING! Move boom accordingly. Goto state #1		WARNING! Move boom accordingly. Goto state #1		WARNING! Move boom accordingly. Goto state #1		Move boom accordingly. Goto state #1			
OPERATE SMARTVALVES	Move valves accordingly. Goto state #1		Move valves accordingly. Goto state #1		Move valves accordingly. Goto state #1		Move valves accordingly. Goto state #1			
CENTER SLANT	WARNING! Goto state #2		WARNING! Goto state #2		Move boom accordingly. 		Move boom accordingly. 			

General info/description

Wash programmes are started with the F soft keys in the right side of the display.

Manual pressure +/- can be used during wash in case pressure is too high or too low.

In case a manual function has to be done by the operator this is shown in the display. Confirm that action has been taken with the F keys.

Alarms (information level) can be neutralized by pressing enter and wash will continue.

When programme is completed this is prompted in the display.

Sensors involved

Suction smart valve potentiometer

Pressure smart valve potentiometer

Rinse tank flow meter

Rinse tank full sensor

Pressure regulation position sensor

Agitation pressure regulation position sensor

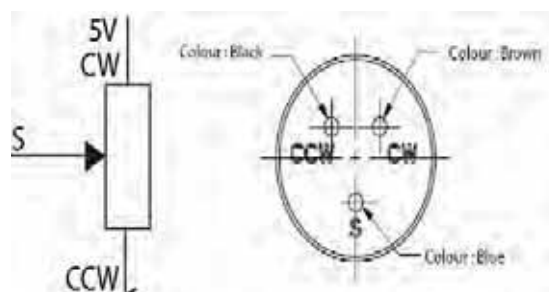
Tank content sensor (tank gauge)

Constants involved

Rinse tank flow constant

Pinning/plugs/colors/codes

Cable is connected to potentiometer as shown:



Fault finding options/results

Check rinse tank content.

Flow out of nozzles must be 30 l/min., raise pressure manually in case it is lower then this.

Measurements

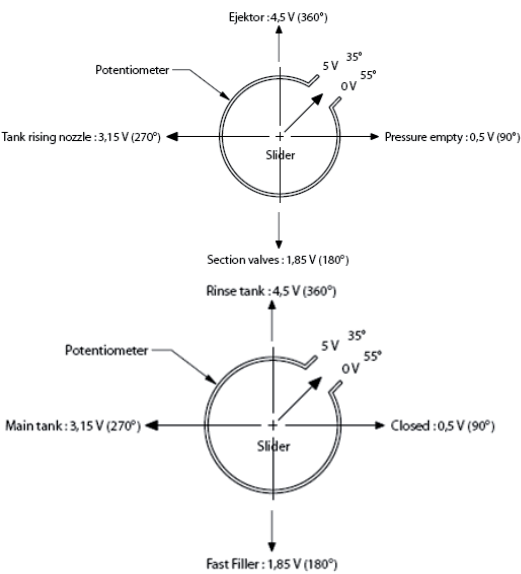
The indicator and symbol on the valve has to line up when washing. If valves doesn't line up then check valve position in menu 4.5.4.5

0 to 5 volt range of the slider corresponds to 340 degrees; note that the blind spot occupies 20 degrees. Hence 14.7 mV corresponds to 1 degree.

Minimum	Slider Voltage Nominal	Maximum	Pressure Smart Valve	AutoFill valve	Suction SmartValve NCM32-44	Suction SmartValve NCM6600
0,35	0,51	0,65	Pressure Empty	Fill open	Blind	MainTank
1,7	1,84	2	Sections	Fill closed	FastFiller	RinseTank
3	3,16	3,3	TankClean	(not used)	MainTank	Blind
4,35	4,49	4,65	Ejector	(Position not used)	RinseTank	FastFiller

10 - AutoWash

Pressure smart valve.



Suction smart valve.

Wash program












































































There are 3 wash programmes

The following diagrams are showing which valves are active in the different steps in the washing programs.

When message "Start double pump" is shown, the hydraulic lever for the double pump must be activated and the "F button" done must be pressed. When prompted to stop the double pump, the oil flow is stopped by the hydraulic outlet and the "F button" are used to confirm that the action is taken.

BoomFlush

	Suction Valve	Pressure Valve	Main ON/OFF	Cyklone Filter Boost	Agitation
01					
02					
03					
04					
05					
06					
07					
08					
09					

Multi Rinse						FastFlush					Suction Valve	Pressure Valve	Main ON/OFF	Cyklone Filter Boost	Agitation
01						01									
02						02									
03						03									
04						04									
05						05									
06						06									
07						07									
08						08									
09						09									
10						10									
11						11	Double Pump Step								
12						12									
13						13									
14						14									
15						15									
16	20	24	28	32	36										
17	21	25	29	33	37										
18	22	26	30	34	38	Double Pump Step									
19	23	27	31	35	39										

General info/description

The system has electrical actuators for fan speed and air/nozzle angle.

Two preset combinations of speed and position can be stored in 1 and 2.

They can be chosen on the Setbox or on the 2 buttons on the front of the Grip.

There is no feedback signal from the actuator to the controller.

Sensors involved


TWIN fan speed sensor in blower housing

Constants involved

R/min. PPU for fan

Pinning/plugs/colors/codes

Color	Harness plug	Actuator plug	Function
White	2	1	PGND
Brown	1	2	SGND
Green	3	3	+12V
Yellow	4	4	SIG
Angle L / R and fan speed has the same color combinations of wires			



Disconnection options/results

If actuators are moving unintended, disconnect the 2 fuses placed in the middle of the JobCom PCB.

Do not unplug the actuators at the AMP plugs (on boom), as spray liquid may corrode the AMP plugs causing internal short-circuits.

Measurements

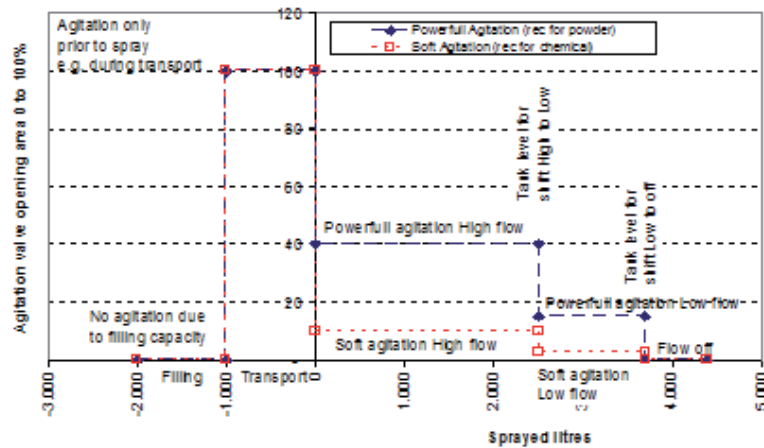
Disconnect the yellow wire for TWIN fan speed, right or left side actuators and measure the Voltage. Must be 0 V. If not so, then there are short-circuits in the actuators or harness.



Note! All other wires must be connected.

General info/description

The schematics show the standard setting from the factory. The curve can be moved back and forth but the syntax can not be changed.



AutoAgitation will stop when FastFiller is used but start up again when AutoFill is stopped or ended.

Long key press on "0 Agitation" on FluidBox will turn off agitation completely.

If agitation is turned off, it can be started by in menu 2.2.6 AutoAgitation.

Sensors involved

Tank Gauge

Agitation pressure regulation position sensor

Constants involved

Tank gauge calibration

Pinning/plugs/colors/codes

Agitation pressure regulation valve

Function	Position	Connector	Color
SGND	-	J2	Black
SIG	Agt fb	J2	Blue
+12V sensor	+	J2	Brown
+12V power	Agt +	J3	Brown
GND	Agt -	J3	Blue

Fault finding options/results

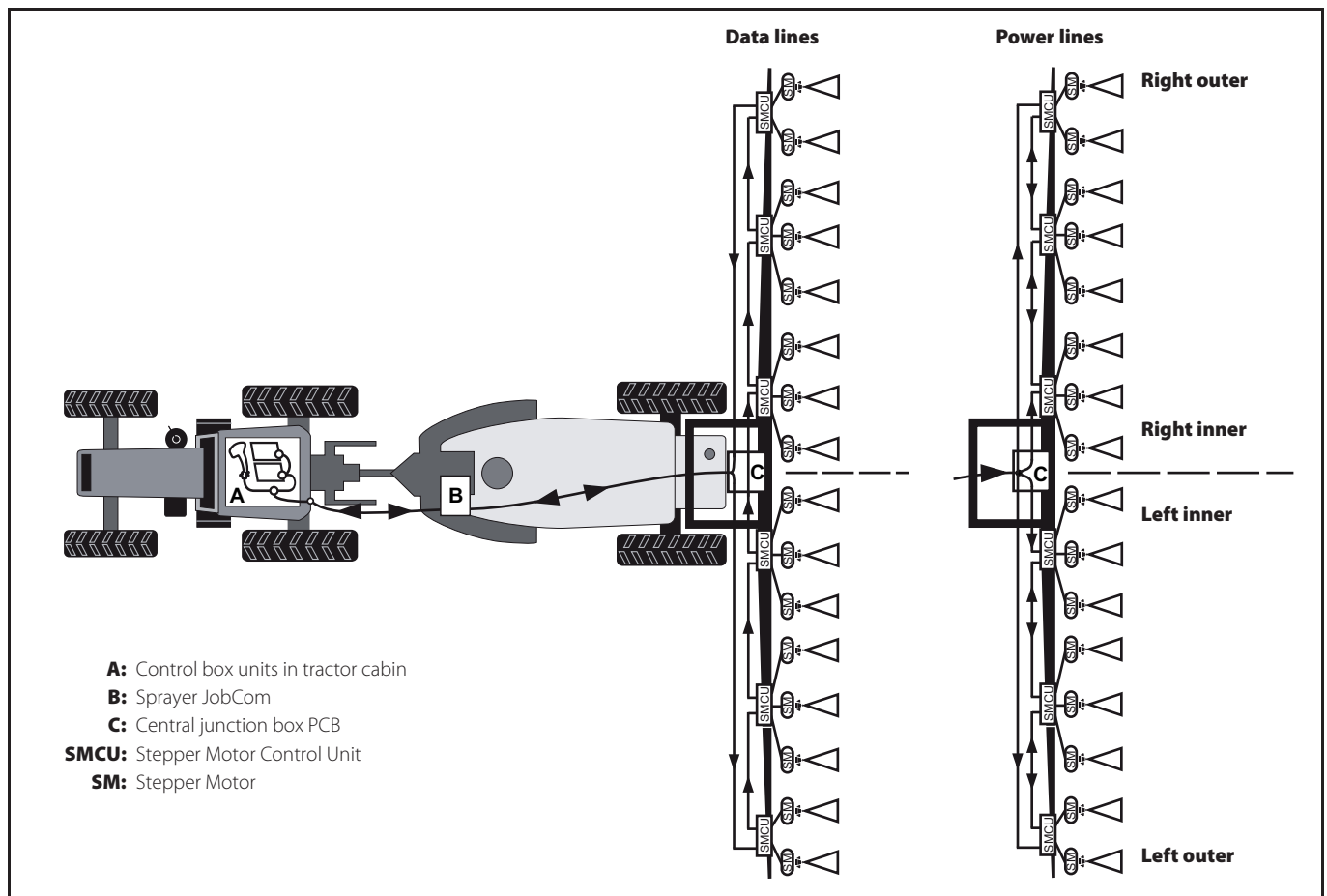
Tank gauge must function correctly.

The procedure for testing the agitation motor is the same as the pressure regulation motor as they are identical.

Measurements

Agitation level can be selected to be shown in the display

General info/description



PrimeFlow is a pressure based system for circulation of liquid to the nozzles before the actual spraying starts. PrimeFlow prevents sedimentation and permits flushing the boom lines without spraying onto the ground.

Electric stepper motors replace the spring-loaded non-drip valves at each nozzle and become the nozzle control unit. A stepper motor control unit controls up to three nozzle valves. The motors are fast with positive action and low power consumption.

Nozzles per boom section can be freely configured so it complies exactly with the farm practice. If needed, the sections can be reprogrammed at a later stage. The controls are at the nozzle and this is ideal for the most effective use of rinse tank water when cleaning the sprayer in the field.

The function of the system is that the Controller in the tractor cabin register if it should turn On or Off one or more sections on the boom, this message could come from the Grip or a AutoSectionControl system that automatically control the sections.

This message is send to the central computer on the sprayer; the JobCom, that handle all In and Outputs, and send it further on to the Stepper Motor Control Units - SMCU, on the boom through the central junction box pcb that is the junction point between the boom electronics and the JobCom.

Each SMCU has a unique ID number that is assigned to the device when it is installed or replaced, this ensure that it is the correct nozzle/section that open or close on the boom.

The communication type between the devices in the tractor and the JobCom follows the CAN Bus terminology. The communication type between the JobCom and the SMCU is a RS485 Serial communication.

When the system is healthy the JobCom transmit the data signal to the central junction box pcb that distribute the signal to the first SMCU on the left side on the boom. The communication goes from left to the right side on the boom. The return signal from the right side of the boom is transmitted to the JobCom again to verify that there is no communication error on the line.

To make the system as reliable as possible and to make it possible to use the system even that there is a broken data communication line are all wires linked through the central junction box pcb at the centre part of the boom.

13 - PrimeFlow

This wire connection makes it also possible to feed all the SMCU from both sides of the boom with power.

If the data signal wire is broken and the return signal does not reach the JobCom will the controller give an alarm. At the same time will the JobCom send a signal to a relay on the central junction box pcb to switch to send the signal to both boom wings, left and right. at the same time.

This allows the system to work properly with one data fault. The system will not be operational if one more data wire breaks.

There is a switch on the central junction box pcb to deactivate the controller alarm but this will not correct the fault.

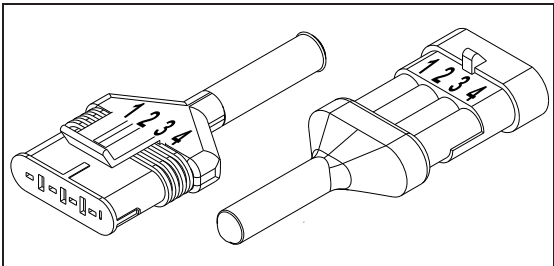
The system is powered through the JobCom from the tractor. To ensure sufficient power to the stepper motors, is the 12VDC from the tractor transformed to 24VDC in a separate step-up transformer device in the JobCom. On the central junction box pcb is there mounted some super capacitors that acts as a battery that can deliver high power to the system when many stepper motors should open or close at the same time.

Parts:

Pinning/plugs/colors/codes

PrimeFlow data/power cable:

PIN	Color	Function
1	White	GND PWD
2	Brown	Bus +
3	Green	Vcc 24VDC
4	Yellow	Bus -

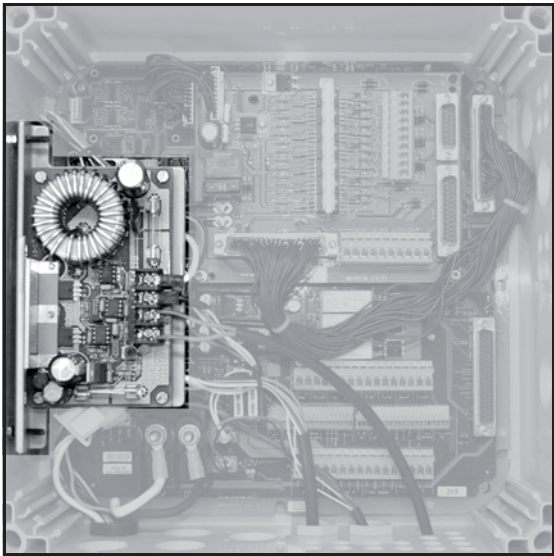


JobCom

When PrimeFlow is fitted an electronic DC/DC 12V to 24V step-up transformer is mounted in the JobCom box.

The transformer step-up the 12 Volt power from the tractor to 24 Volt to keep the voltage over the minimum limit required of the stepper motor drivers.

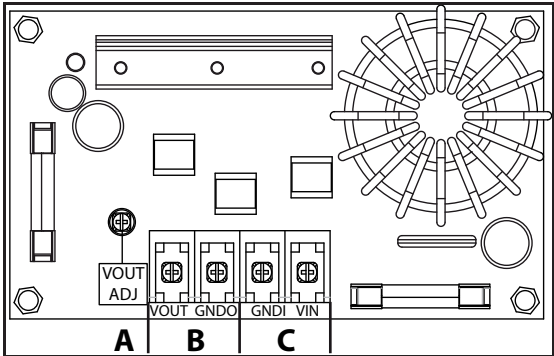
JobCom with PrimeFlow step-up transformer



PrimeFlow step-up transformer
P/N 26016400

- A:** Output voltage adjustable, 20 to 30 VDC. Hardi default 24VDC
- B:** VDC Out to central junction box PCB
- C:** VDC in from JobCom/tractor

The converter has two fuses:
30AT F2 / 32V
10AT F1 / 32V, Hardi P/N 26023500.



Central junction box PCB

The central junction box PCB, P/N 26027000 is mounted on the centre part of the boom.

The pcb is the central connection point between the JobCom and the parts on the boom, not only for the PrimeFlow but also for the sensors and valves.

The PrimeFlow system is powered from the step-up transformer in the JobCom box to the power connector **F** on the PCB. The super capacitors, **A**, are charged from the step-up transformer in the JobCom box and acts as a back-up power supply for the 24VDC supply from the JobCom. When many stepper motors are turned On or Off at the same time they can drain the power supply and draw it below the minimum required power; the back-up power will prevent this to occur.

The LED DS2 "Voltage Right OK" and DS3 "Voltage Left OK", **B**, indicate the status of the power to the right and left side of the boom. If the LED is off is there a power supply fault.

If there is a short circuit on the left or right side of the boom one of the two 10A fuses, B will be burned.

When the system is healthy the LED DS1 "Full Duplex" **C** will light.

The switch S1, **C**, is to deactivate the alarm 99, "PrimeFlow data cable weakness" on the Controller but it will not correct the fault.

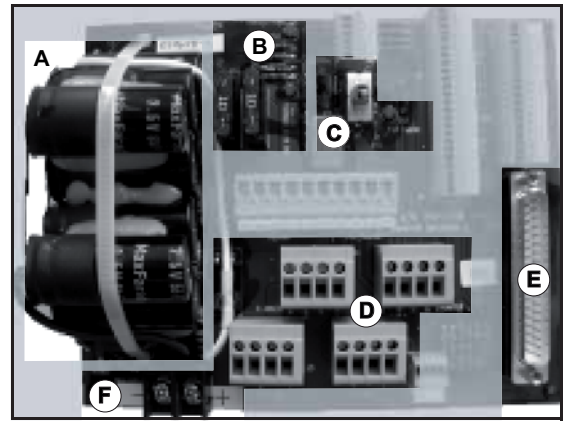
The half and full duplex terminology is not use to describe the type of communication between the JobCom and the SMCU on the boom but is only used as a general view of the communication to the boom. The communication can either be half or full duplex what means the data is send to one or both boom wings.

The data communication protocol with the SMCU always follows the RS485, half duplex standard.

The JobCom can not detect any data communication fault with the switch in half duplex as the JobCom not will receive the data signal from the SMCU as an acknowledge for a healthy communication.

If there is a data communication error on the line from the JobCom to the SMCU the Controller will give the alarm 99, "Data cable weakness", see more in the PrimeFlow alarm chapter about the alarms.

The SMCU on the boom are connected to the **D** terminals on the PCB. The low power and data connection from the JobCom is connected to the **E** connector.



SMCU

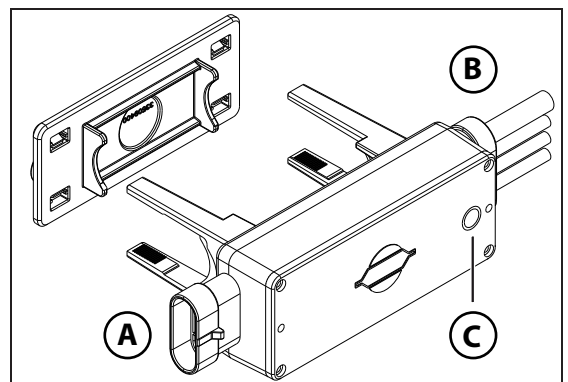
The Stepper Motor Control Unit - SMCU, is the device that is controlling the stepper motor.

Each SMCU has to be programmed with a unique ID number that refer to the units position on the boom. The units are programmed from the left to the right side of the boom.

In the "Test Nozzle positions" test in menu E8.6.4.1 the stepper motor nozzle, farthest to left on the boom will open first. Then the nozzle next to the first one on the right side will open.

The menu "E8.6.4.2 Assign nozzle position to SMCU" assigns ID numbers and nozzles positions to the SMCU. This information is also saved in the JobCom and is used to address the data to the SMCU.

If the JobCom is reset the information in the JobCom may be lost, but can be reloaded from the SMCU to the JobCom with the menu E8.6.4.2.



- A. Connector IN
- B. Cables Out, Bus, power and stepper motor connections
- C. Status LED

The "Assign nozzle position to SMCU" menu can operate in two ways:

13 - PrimeFlow

"1 beep way": Reconfirm SMCU ID and nozzle position numbers. JobCom updates data from the SMCU. No data is programmed in the SMCU.

"2 or 3 beep way": SMCU ID number and nozzle position on boom is programmed in SMCU. JobCom updates data in the SMCU.

There are two types of SMCU; one that can control 2 stepper motors and one that can control 3 stepper motors.

A 3 stepper motor type can be programmed to control 2 stepper motors, this is done in menu E8.6.4.4 "Force to 2 motor drive".



Note: It is not possible to reprogram a 2 stepper motor to a 3 stepper motor once it has been changed from 3 to 2 motors.

LED codes on SMCU

LED is light at all time: SMCU is reset to factory setting. The unit has no ID number. The Jobcom can not open or close the stepper motor.

LED is flashing, slow or fast: SMCU is programmed with a ID number and nozzle position.

LED is flashing slow, 1 Hz: All nozzles are closed.

LED is flashing fast, 4 Hz: one or more nozzles are open.

The power supply should only be connected to the left side of the boom when programming the SMCU's, and not from the boom centre section or the right boom side.

When resetting a single SMCU should all other SMCU be disconnected from the system.

Stepper motor valve

The stepper motor is the device that open and close the flow to the nozzles. The picture show the stepper motor with nozzle house and boom fastener.

The primary part inside the complete device is:

1. Spindle
2. Bushing
3. Piston

and the o-rings.

The stepper motor, and the above mention parts are supplied as one unit, there are no exchangeable parts in the unit.

The nozzle house **4** is supplied as one separate part.

The bushing is the sealing part between the nozzle house and the stepper motor electronic, it keep the water and chemicals out of the motor house.

The only moving part is the spindle in the motor house with the piston on the end in the nozzle house. The piston move in and out of the nozzle holder cone to open or close for the flow to the nozzle.

The piston has only two positions, full open or full closed.

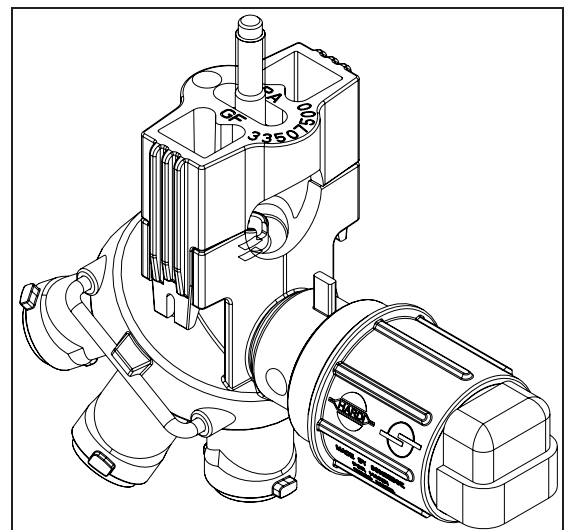
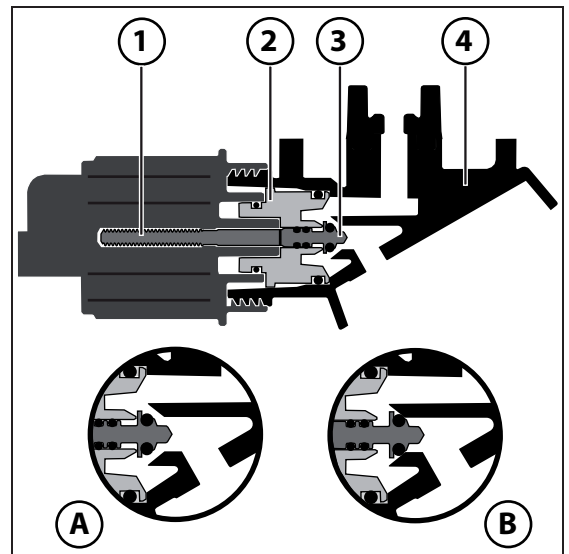
Picture **A** show the valve open and **B** as closed.

Stepper motor data:

8 L/min. max. with 1 bar pressure drop

0.5 sec. reaction time

Grease between O-rings



Programming a complete PrimeFlow system

The PrimeFlow system is programmed in menu E8.6.4.2 "Assign nozzle position to SMCU" where the SMCU is programmed with a unique ID number, a position on the boom and a nozzle position is assigned to the SMCU.

The programming of the system has to be done before the system is operational.

When programming the system for the first time or after a reset of nozzle position in Menu E8.6.4.3 all the SMCU has to be disconnected from each other and the Central junction box PCB to prevent two SMCU to be programmed with the same ID number. All SMCU LED must be Off prior to the programming of the system.

The system is always programmed from the left boom side to the right boom side. The SMCU farthest to the left on the boom has the lowest ID number.

When programming the controller will count the number of nozzles each SMCU is controlling and for each assigned nozzle the controller will give a beep.

When it is a 2 motor SMCU: The controller gives 2 beeps and the controller display increases the counter by 2.

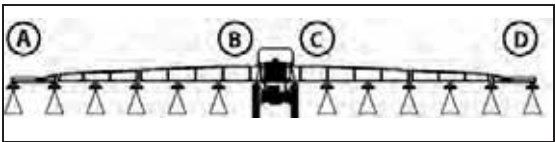
When it is a 3 motor SMCU: The controller gives 3 beeps and the controller display increases the counter by 3.

If the controller does not increase the number of nozzles when programming, do not continue to the next SMCU as it is not possible to finalize the programming of the complete boom before all SMCU are programmed. Replace the faulty SMCU with a new SMCU before continuing to the next SMCU.

Programming procedure:

- A: Left outer, disconnected
- B: Left inner, disconnected
- C: Right inner, disconnected
- D: Right outer, disconnected

All SMCU are disconnected from each other.






i NOTE: Check that no PrimeFlow SMCU's LED flash or lit up constantly.


Choose Menu E8.6.4.2 Assign nozzle positions to SMCU

E8.6.4 PrimeFlow setup	
E8.6.4.1	Test Nozzle positions
» E8.6.4.2	Assign nozzle position to SMCU
E8.6.4.3	Reset nozzle position in SMCU
E8.6.4.4	Force to 2 motor drive
E8.6.4.5	Reserved
E8.6.4.6	Change Nozzle order
Assign nozzle position after replacement	
Confirm nozzle position after master reset	

Connect the cable from the Central junction box PCB to the first SMCU; the one farthest to the left on the boom.

Press Enter  to start programming the SMCU.

auto  Track auto   04



E8.6.4.2.1 Prepare cables for assign pos

0

Connect SMCU having nozzle position.
Disconnect reset SMCU. Then press enter.

13 - PrimeFlow

Terminal counts up the number for confirmed nozzles and gives a single beep for each nozzle.

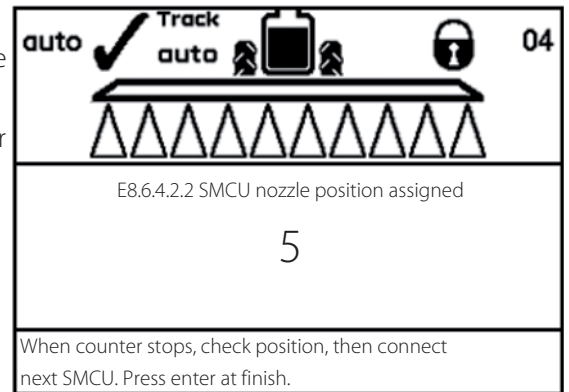
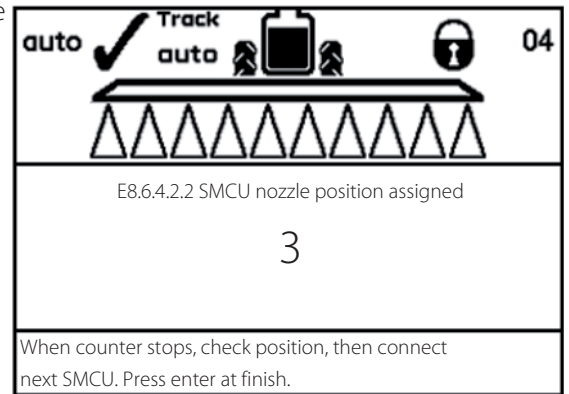
When the SMCU is programmed the red LED will blink slow.

Programming SMCU number 2 from left:

Connect the cable from the first SMCU to the next SMCU to the right side of the first SMCU.

The terminal will give 2 or 3 beeps; a 2 or 3 motor SMCU, and the counter will increase by 2 or 3.

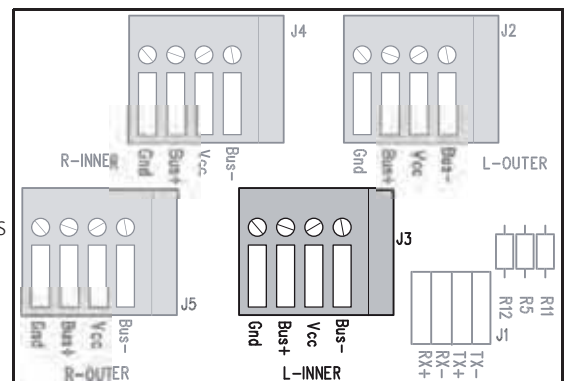
When the SMCU is programmed the LED will blink slow.



Continue programming the SMCU on the left boom until the last SMCU on the left boom side is reached.

Connect the last SMCU on the left boom to the cable from the Central junction box PCB terminal J3 "L-INNER".

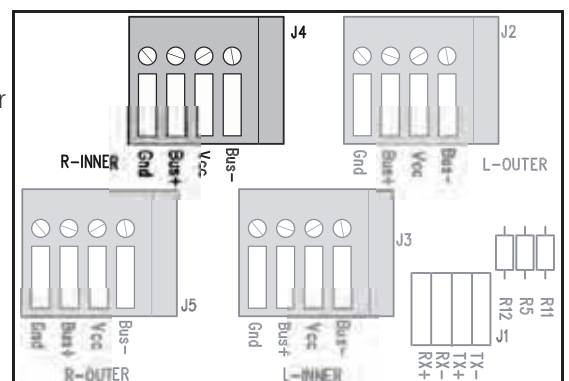
The controller will not increase the number of nozzles as no new SMCU is connected. This is only a connection to the PCB.



Connect the cable from the Central junction box PCB terminal J4 "R-INNER" to the first SMCU on the right side of right boom.

The terminal will give 2 or 3 beeps; a 2 or 3 motor SMCU, and the counter will increase by 2 or 3.

Continue programming the SMCU until the last SMCU on the end right boom side is reached.







After connecting the last SMCU check that the terminal display counter show the actual number of nozzles on the boom.

If the number is not correct, there is one ore more SMCU that is not programmed or has a incorrect number of nozzles programmed.

If the number is correct connect the cable from the Central junction box PCB terminal J5 "R-OUTER" to the last SMCU to close the power and data communication loop with the Central junction box PCB and JobCom.

Press Enter  to finalize the programming procedure.

auto  Track auto   04



E8.6.4.2.2 SMCU nozzle position assigned

48

When counter stops, check position, then connect next SMCU. Press enter at finish.

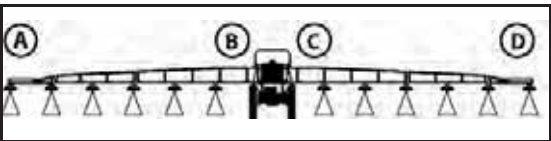
Reprogram PrimeFlow after a Master reset

If a master reset made for another reason e.g. software update has been done a "Assign nozzle position" setup in menu E8.6.4.2 has to been performed.
The master reset clears the information stored i JobCom about the connected PrimeFlow SMCU's. When performing confirmation of already programmed PrimeFlow SMCU's this data is recreated in the JobCom.

Confirmation of already programmed PrimeFlow SMCU's is made with all cables mounted. The PrimeFlow SMCU's do not need to be powered up one at a time

Check that all PrimeFlow SMCU's LED either blinks or is lit up constantly.

- A: Left outer, connected
- B: Left inner, connected
- C: Right inner, connected
- D: Right outer, connected



Choose Menu E8.6.4.2 Assign nozzle positions to SMCU

E8.6.4 PrimeFlow setup

E8.6.4.1

» E8.6.4.2

E8.6.4.3

E8.6.4.4

E8.6.4.5

E8.6.4.6

Test Nozzle positions

Assign nozzle position to SMCU

Reset nozzle position in SMCU

Force to 2 motor drive




Reserved


Change Nozzle order

Assign nozzle position after replacement

Confirm nozzle position after master reset

Press Enter  to start confirmation

auto  Track auto   04



E8.6.4.2.1 Prepare cables for assign pos

0


Connect SMCU having nozzle position.
Disconnect reset SMCU. Then press enter.

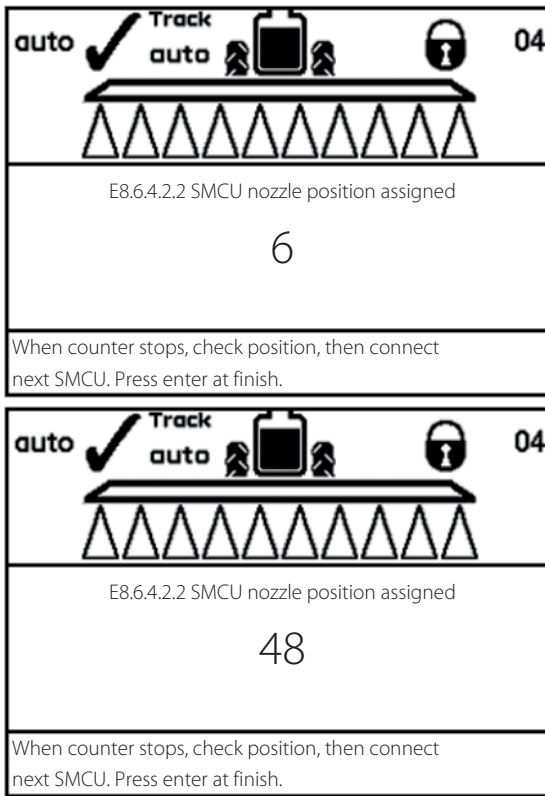
13 - PrimeFlow

Terminal counts up number for confirmed nozzles and gives a single beep for each nozzle.

When terminal stops counting check that the terminal display counter show the actual number of nozzles on the boom.

If the number is incorrect, is there one or more SMCU that is not programmed or has an incorrect number of nozzles programmed.

Press Enter  to finish and return



Test of a complete PrimeFlow system setup

Open all sections.

Switches on Grip point downwards.

Start the pump.

Start HC6500 in work screen.

Press Main On/Off button to close sections, red frame triangles.

Press Main On/Off button to open sections, green solid triangles.

Check that all SMCU LED's blink fast at 4Hz.

Adjust pressure to between 3 and 5 bar.

Close pressure regulation valve.

Close agitation, if flow is inadequate.

Check that all nozzles spray.

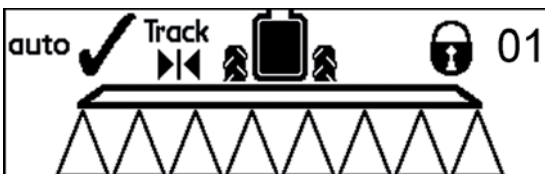
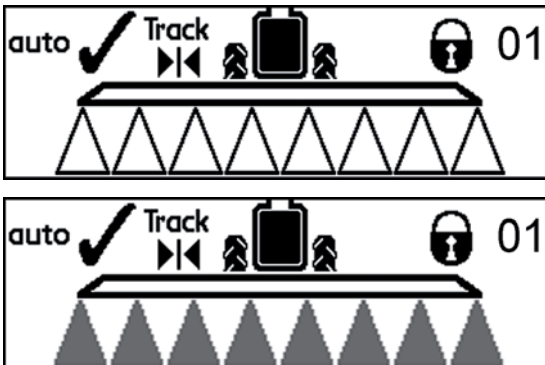
The nozzles must not be closed or drip.

Press Main On/Off button to close all sections; red frame triangles.

Check that all SMCU LED's blink slow at 1Hz.

Check that all nozzles are closed i.e. do not spray or drip.

If all nozzles can spray and close are the system functional.



Nozzle positions test

The nozzle position test confirm that all the nozzles are able to open and close at the same time, it is also testing that the nozzles are programmed to be on the correct place on the boom. This is done first by open all the nozzles and then close them again. Then one by one nozzle, from the left to the right side of the boom will open for 2 sec., at this test the nozzle farthest to the left should open first and then the next to it on the right side.

If the sequence jump from one nozzle to another nozzle not next to the right, the system has to be reprogrammed as described in the chapter “Programming a complete PrimeFlow system, page 73”.

Start the HC6500 in extended menu

Select Menu E8.6.4 PrimeFlow setup

Select Menu E8.6.4.1 Test Nozzle positions

Test sequence is started

Check on boom that sequence does not jump

Immediately
All nozzles are open for 5 sec.
Display show green solid triangles
All LED's blink fast at 4Hz
Display show 0

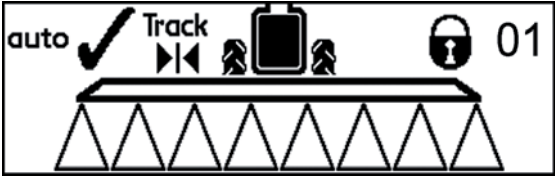
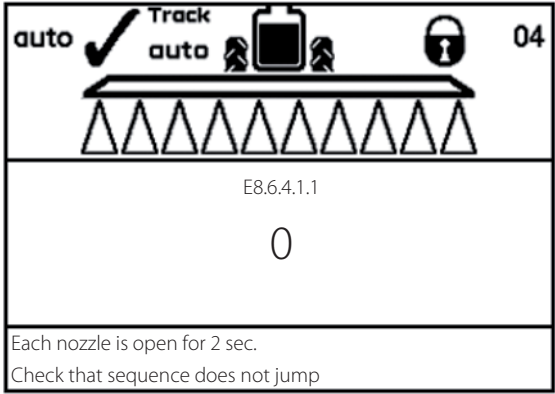
After 4 seconds
All nozzles are closed
Display show red frame triangles
All LED's blink slow at 1Hz
Display show 0

E8.6 Sprayer type, liquid, boom	
E8.6.1	Liquid system
E8.6.2	Dual Line
E8.6.3	Boom hydraulics type
» E8.6.4	PrimeFlow setup
E8.6.5	AutoWash AutoFill setup

Setup and test SMCU's
First select PrimeFlow in E8.6.1.3

E8.6.4 PrimeFlow setup	
» E8.6.4.1	Test Nozzle position
E8.6.4.2	Assign nozzle position to SMCU
E8.6.4.3	Reset nozzle position in SMCU
E8.6.4.4	Force to 2 motor drive
E8.6.4.5	Reserved
E8.6.4.6	Change Nozzle order

Each nozzle is open for 2 sec.
Check that sequence does not jump



13 - PrimeFlow

After 8 seconds

All nozzles are open, display show green solid triangles

All LED's blink fast at 4Hz

Display show 0



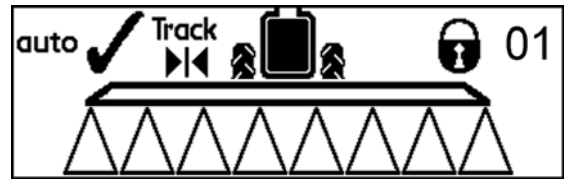
After 12 seconds

All nozzles are closed

Display show red frame triangles

All LED's blink slow at 1Hz

Display show 0



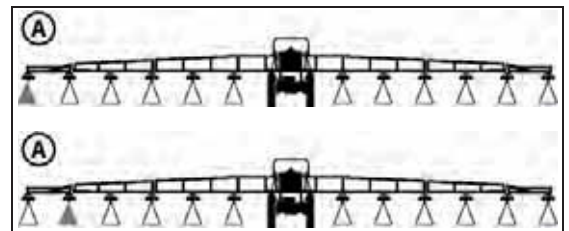
Each nozzle open for 2 sec. starting from the left side of the boom

A: Left boom side

Nozzle 1 sprays for 2 seconds

Nozzle 2 sprays for 2 seconds

Display show the nozzle position number

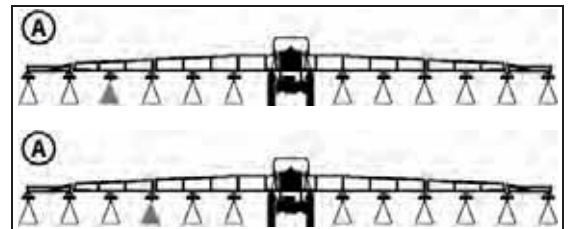


A: Left boom side

Nozzle 3 sprays for 2 seconds

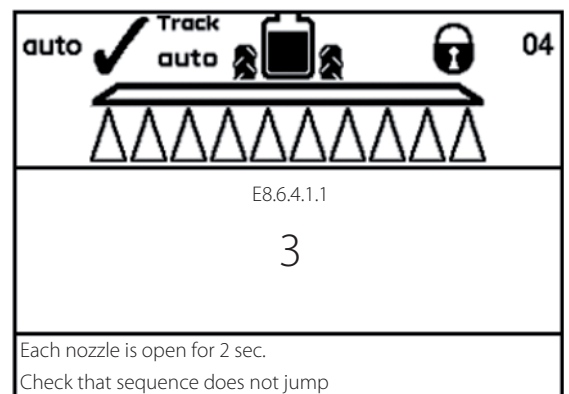
Nozzle 4 sprays for 2 seconds

Nozzle xx..... sprays for 2 seconds.



Display show positive number when the nozzle just opened has a short cable being the SMCU's first nozzle.

Display show negative number when the nozzle just opened has a medium or long cable being the SMCU's 2nd or 3rd nozzle.



When the test has reached the last nozzle on the right boom side it will start the loop from the beginning by open for all the nozzles.

Replace a SMCU in a programmed system

Before a new SMCU can be used in the PrimeFlow system it has to be programmed with a nozzle position, therefore perform following procedure when you receive a new SMCU from Hardi.

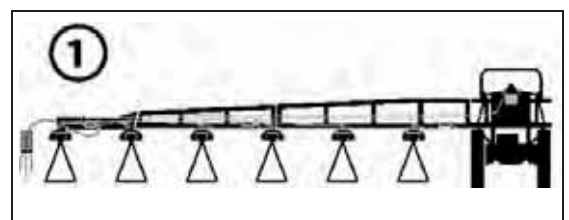
Check that the spare part SMCU is reset.

Connect the new PrimeFlow SMCU to any connector, ex. at the connector on the left outer boom side.

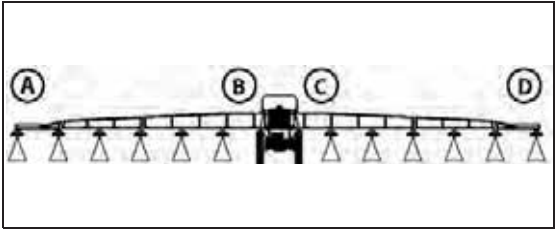
Check that LED turns On and that it does not blink.

LED on others SMCU should blink.

If the LED blinks on the spare SMCU, it has assigned a nozzle position and cannot be assigned a new position.



Disconnect the connectors on Right Outer boom side.
A: Left outer, connected
B: Left inner, connected
C: Right inner, connected
D: Right outer, disconnected
Check that the LED on the last SMCU on the right boom side lights



Mount the new SMCU on to the boom tube.
Do not connect the new SMCU to the PrimeFlow bus yet




Select Menu E8.6.4.2 Assign nozzle position to SMCU


E8.6.4 PrimeFlow setup	
E8.6.4.1	Test Nozzle positions
» E8.6.4.2	Assign nozzle position to SMCU
E8.6.4.3	Reset nozzle position in SMCU
E8.6.4.4	Force to 2 motor drive
E8.6.4.5	Reserved
E8.6.4.6	Change Nozzle order
Assign nozzle position after replacement	
Confirm nozzle position after master reset	

Press Enter 

Check that display counts up until the PrimeFlow SMCU to be replaced.

Check that terminal for each existing SMCU gives 1 beep, which means that existing SMCU ID is correct.

auto  Track auto   04



E8.6.4.2.1 Prepare cables for assign pos

0

Connect SMCU having nozzle position
Disconnect reset SMCU. Then press enter.




When the terminal stops counting and beeping, then connect the cable from left SMCU to the new SMCU.
All existing SMCU blinks.
New SMCU begin to blink.


The terminal will give 2 or 3 beeps; a 2 or 3 motor SMCU, and the counter will increase by 2 or 3.

Connect the SMCU to the right of the new SMCU to the new SMCU.

The terminal will count the rest of the boom; check that the total number of nozzles on the boom is correct.

The new PrimeFlow SMCU is now programmed.

auto  Track auto   04



E8.6.4.2.2 SMCU nozzle position assigned

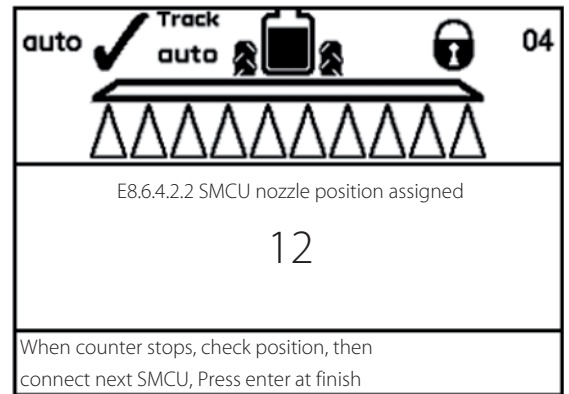
9

When counter stops, check position, then
connect next SMCU, Press enter at finish

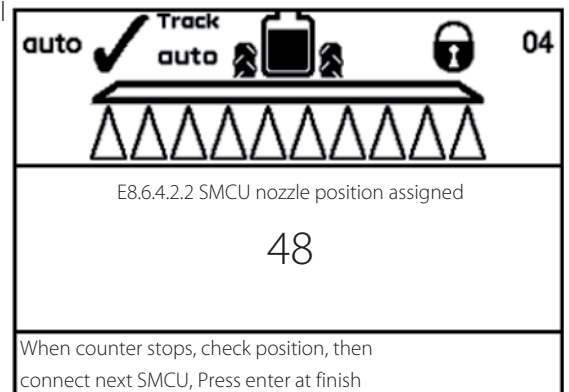
13 - PrimeFlow

Check that display continues to count.

Check that terminal for each existing SMCU gives 1 beep, which means that existing SMCU ID is correct.

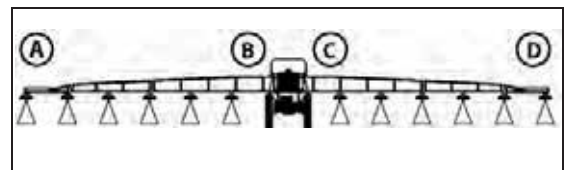


When the Terminal stops counting and beeping, check that the terminal display counter show the actual number of nozzles on the boom.



Connect the cable on right outer boom side to the SMCU farthest on the right boom side.

- A: Left outer, connected
- B: Left inner, connected
- C: Right inner, connected
- D: Right outer, connected



All SMCU connectors on the boom are connected again.

Perform boom test and single nozzle test to verify that the replacement succeeded.

Reset a single SMCU

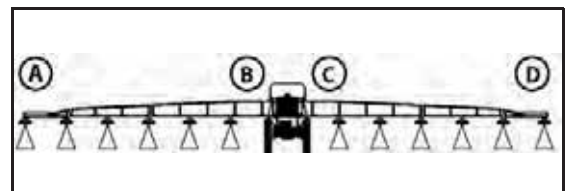
If a SMCU has assigned a ID number it has to be reset before it can be reused on another position on a boom. The LED is flashing if the SMCU has a ID number assigned. If the LED light constant it is not programmed.

Prior to a reset of a single SMCU on the boom the PrimeFlow system should be checked for power or databus fault, see chapter Test of a complete PrimeFlow system setup, page 76.

Reset procedure:

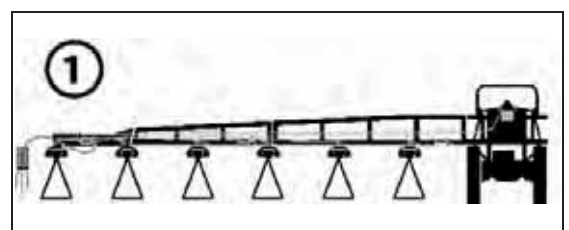
Disconnect the connectors.

- A: Left Outer. Disconnect connectors on SMCU.
- B: Left Inner. Disconnect extension cable.
- C: Right Inner. Disconnect connectors on SMCU.
- D: Right Outer. Disconnect extension cable.



Check that all SMCU LED's are Off on the entire boom.

Connect the SMCU to be reset to the cable at Left Outer boom side.



Select E8.6.4.3 Reset nozzle position in SMCU

Press Enter 

Check that the SMCU LED on the spare SMCU lights constantly.

The SMCU is now reset.

The controller counts up.


When the SMCU's LED lights constantly press ESC to interrupt the procedure or wait until the controller has counted full up and returns to 0.

The SMCU is now prepared to be reprogrammed, see Replace a SMCU in a programmed system, page 78 or Programming a complete PrimeFlow system, page 73 how to use the SMCU and programme the PrimeFlow system.

E8.6.4 PrimeFlow setup	
E8.6.4.1	Test Nozzle positions
E8.6.4.2	Assign nozzle position to SMCU
» E8.6.4.3	Reset nozzle position in SMCU
E8.6.4.4	Force to 2 motor drive
E8.6.4.5	Reserved
E8.6.4.6	Change Nozzle order


Resets all connected SMCU's to prepare for assignment of new nozzle position


auto




Track

auto





04




E8.6.4.3.1 Confirm reset of SMCU's

0


Connect SMCU at left side to reset.
Disconnect right side. ESC to exit.


auto




Track

auto





04



E8.6.4.3.2 Resetting SMCU


1

SMCU's are reset. JobCom verifies each
nozzle position for SMCU.

13 - PrimeFlow

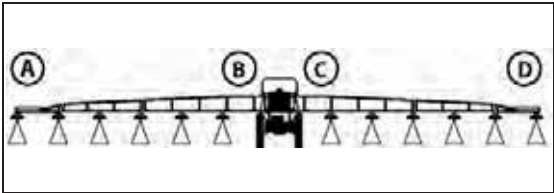
Change SMCU 3 motor to a 2 motor drive

For emergency service issues is it possible to change a 3 motor SMCU to a 2 motor SMCU. It is not recommended to use a 3 motor SMCU permanent as a 2 motor SMCU.
The SMCU must not be assigned with an ID number; the LED should light constant when connected to the PrimeFlow system.



Note: It is not possible to reprogram a 2 stepper motor to a 3 stepper motor once it has be changed from 3 to 2 motors.

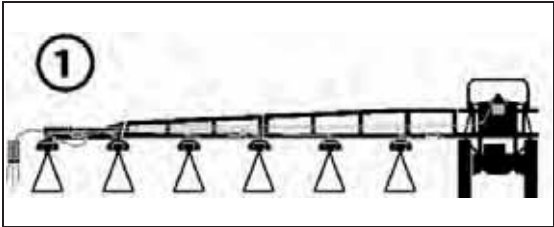
Program procedure:
Disconnect cables as following:
A: Left outer, disconnected
B: Left inner, disconnected
C: Right inner, disconnected
D: Right outer, disconnected



Check that LED are Off on all SMCU.

Connect the SMCU that should be changed from 3 to 2 motors to the left outer cable from the central junction box PCB.

LED change from blinks to constant light.

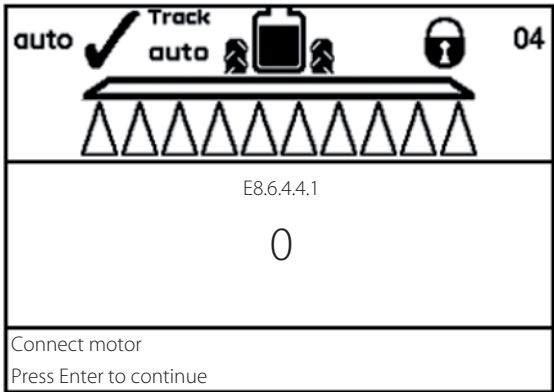


Select Force to 2 motor drive

E8.6.4 PrimeFlow setup	
E8.6.4.1	Test Nozzle positions
E8.6.4.2	Assign nozzle position to SMCU
E8.6.4.3	Reset nozzle position in SMCU
» E8.6.4.4	Force to 2 motor drive
E8.6.4.5	Reserved
E8.6.4.6	Change Nozzle order

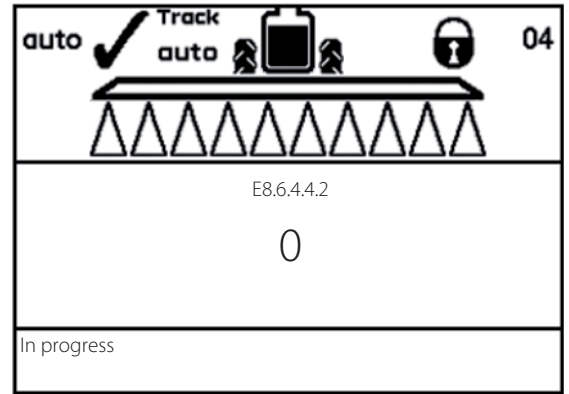
For service a 3 motor SMCU can be forced to be a 2 motor drive

Connect SMCU
Press Enter  to continue




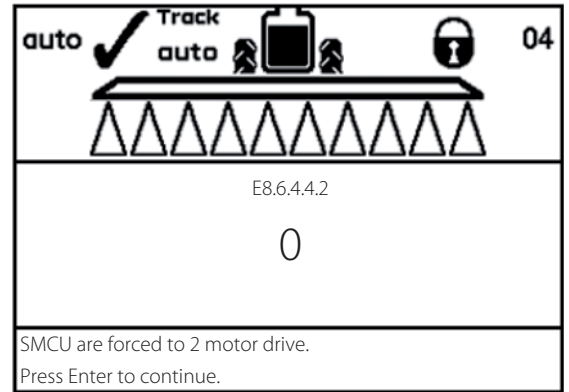
Process in progress

The controller gives 3 beeps to confirm the succeed programming



The controller gives 3 beeps to confirm the succeed programming

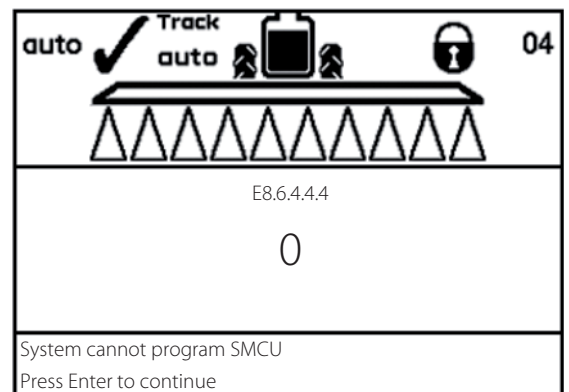
Press Enter  to return to main menu.



If the SMCU is programmed with an ID number prior to the attempt to programmed it to be a 2 motor drive this error message will appear:

"System cannot program SMCU"

Use the procedure Reset a single SMCU, page 80 and retry.



Change Nozzle order

The nozzle order for each SMCU is defined by the length of the stepper motor cable. If necessary the nozzle order for each SMCU can be changed, this is done in menu E8.6.4.6 "Change Nozzle order".

Break-away sections and brackets on TWIN sprayers can block the mounting of the SMCU at the most left nozzle. The SMCU can be mowed towards right side and the longer cable is now lead back towards the left side. With this setup is it necessary to change the nozzle order for the SMCU to keep the correct nozzle sequence for the whole boom.



NOTE: Changes made for the nozzle order is cleared when a Master reset of the system is performed.

Default nozzle order for a SMCU is:

2 motor SMCU: Short cable, most left
Medium cable, most right

3 motor SMCU: Short cable, most left
Medium cable, middle position
Long cable, most right

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Select E8.6.4.6 Change Nozzle order

Type in the SMCU number
Count the SMCU from left boom side

Cables Short Med Long is standard for a 3 nozzle SMCU
Select the desirable cable configuration

Cables Short Med is standard for a 2 nozzle SMCU
Select the desirable cable configuration

E8.6.4 PrimeFlow setup	
E8.6.4.1	Test Nozzle positions
E8.6.4.2	Assign nozzle position to SMCU
E8.6.4.3	Reset nozzle position in SMCU
E8.6.4.4	Force to 2 motor drive
E8.6.4.5	Reserved
» E8.6.4.6	Change Nozzle order
Keyin SMCU number for change of nozzle order at bracket	

<div>auto ✓ Track auto   04</div> <div></div>	
E8.6.4.6.1	
4	
No	
Keyin SMCU number for change of nozzle order at bracket	

E8.6.4.6.1.2
» E8.6.4.6.1.2.1 Cables Short Med Long
E8.6.4.6.1.2.2 Cables Long Med Short
E8.6.4.6.1.2.3 Cables Med Short Long
E8.6.4.6.1.2.4 Cables Long Short Med
3 nozzle SMCU standard

E8.6.4.6.1.1
» E8.6.4.6.1.1.1 Cables Short - Medium
E8.6.4.6.1.1.2 Cables Medium - Short
2 nozzle SMCU standard

Fault finding options and results

PrimeFlow test menus

There is some test menus in the system user menu where it is possible to check the health or find fault in the PrimeFlow system. Prior to a practical fault finding check these menus to read out the settings and errors notice by the system.

The menu 4.5 Test of sensor has tree submenus with PrimeFlow tests:

4.5.3 PrimeFlow test

4.5.4 Input test

4.5.6 PrimeFlow SMCU status

4.5 Test of sensors	
4.5.1	Flow Speed Optional sensors
4.5.2	Active keys
» 4.5.3	PrimeFlow test
4.5.4	Input test
4.5.5	Valve test
4.5.6	PrimeFlow SMCU status
PrimeFlow test for nozzle and PrimeFlow computers on boom	

Menu 4.5.3 shows the detail data for each single SMCU mounted in the system.

Select the SMCU to read out details.

The last two digits in the menu number is the SMCU number, e.g. 4.5.3.08 is the details for SMCU number 8 counted from the left side of the boom.

4.5.3 PrimeFlow test	
4.5.3.01	PrimeFlow computer status
4.5.3.02	PrimeFlow computer status
4.5.3.03	PrimeFlow computer status
4.5.3.04	PrimeFlow computer status
4.5.3.05	PrimeFlow computer status
4.5.3.06	PrimeFlow computer status
4.5.3.07	PrimeFlow computer status
» 4.5.3.08	PrimeFlow computer status
4.5.3.09	PrimeFlow computer status
Press Arrow DOWN to see next SMCU	
Arrow UP to see previous	

Details for SMCU number 1.

4.5.3.1 PrimeFlow computer status		
Total SMCU's	16	No
Total nozzles	43	No
This SMCU position	8	No
Nozzle order	SML	No
Nozzle no short cab.	1	No
Nozzle medium cable	2	No
Nozzle no long cable	3	No
Count of data error	0	Counts
Count of power error	0	Counts

The menu 4.5.4.5 shows the PrimeFlow power supply voltage supplied to the left and right boom.

The readout is from the central junction box PCB and does not show the actual voltage on the boom.

If fuse F1 or F2 on the central junction box PCB is burned the voltage readout will be 0 Volt for the actual fuse.

4.5.4.5 Analog 2 inputs Extra		
Distance center	0.00	Volt
PrimeFlow volt left	24	Volt
PrimeFlow volt right	24	Volt
T-Pos position	0.00	Volt
Relative humidity	0.00	Volt
Pendulum lock	0.00	Volt
Suction SV potmeter	0.00	Volt
Press. SV potmeter	0.00	Volt
Fill valve potmeter	0.00	Volt
Test Analog 2 sensors:		
Electric smart valves, extra		

13 - PrimeFlow

In menu 4.5.6.1 are all the SMCU listed with the first nozzle number counted from the left.

Menu 4.5.6 shows whether the mounted SMCU is a 2 or 3 nozzle SMCU

Menu 4.5.6.3 shows whether there are changed nozzle order in some of the SMCU's.

Menu 4.5.6.4 shows how many times a SMCU did not respond to a alive telegram, data signal, from the JobCom.

Menu 4.5.6.5 shows how many times a SMCU did shut down due to low voltage power supply.

Menu 4.5.6.1 show that there are 16 SMCU on the boom.

SMCU number 1 has nozzles number from 1 to 3. SMCU number 2 has nozzles number 4,5 and 6. SMCU 16 has first nozzle as number 42.

In this menu is it not possible to see how many nozzle each SMCU controls, see menu 4.5.6.2.

The "-->" show the live update of the counting.

Menu 4.5.6.2 show that there are 16 SMCU on the boom.

SMCU 4,7,9,10 and 16 are 2 nozzles SMCU's.

SMCU 1,2,3,5,6,8,11,12,13,14 and 15 are 3 nozzles SMCU's.

The "-->" show the live update of the counting.

Menu 4.5.6.3 show that SMCU number 1 has changed nozzle order from SML, Short Medium Long, cable to LSM, Long Short Medium.

All other SMCU are normal with SM or SML nozzle order.

4.5.6 PrimeFlow SMCU status	
» 4.5.6.1	First nozzle for SMCU
4.5.6.2	SMCU 2 or 3 nozzle
4.5.6.3	Nozzle order
4.5.6.4	Count of data error
4.5.6.5	Count of power error
Position of first nozzle on boom counted from left	


4.5.6.1 First nozzle for SMCU															
1:	1	4	7	10	12	15	18	20	23	25					
11:	27	30	33	36	39	42									
21:															
-->:															
41:															
51:															
61:															
71:															
81:															
Position of first nozzle on boom counted from left															

4.5.6.2 SMCU 2 or 3 nozzle															
1:	3	3	3	2	3	3	2	3	2	2					
11:	3	3	3	3	3	2									
21:															
-->:															
41:															
51:															
61:															
71:															
81:															
Produced or reprogrammed. SMCU with 3 cables could be changed to 2 nozzles															

4.5.6.3 Nozzle order															
1: LSM	-	-	-	-	-	-	-	-	-	-					
11:	-	-	-	-	-	-									
21:															
-->:															
41:															
51:															
61:															
71:															
81:															
Show - - - when connected in normal order Short Medium Long from left															

Menu 4.5.6.4 shows that SMCU 2,3 and 4 has not respond to a alive telegram from the JobCom one time each.

The counter is only counting when there is no connection on the data line. If there is a short circuit between two cables the counter will not count.

The  reset the counter.

4.5.6.4 Count of data error										
1:	0	1	1	1	0	0	0	0	0	0
11:	0	0	0	0	0	0				
21:										
-->:										
41:										
51:										
61:										
71:										
81:										
Times were SMCU did not respond to alive telegram. C to reset counters										

Menu 4.5.6.5 shows that SMCU 5,7,8,9 and 13 did shut down due to low voltage power supply.

The  reset the counter.

4.5.6.5 Count of power error										
1:	0	0	0	0	1	0	1	1	1	0
11:	0	0	1	0	0	0				
21:										
-->:										
41:										
51:										
61:										
71:										
81:										
Times were SMCU shot down due to low voltage. C to reset counters										

13 - PrimeFlow

General fault finding

1. Check fuse on PrimeFlow step-up transformer in the JobCom
2. In the central junction box PCB on the centre part of the boom check:
 - The data com switch (S1) is in down position, and the LED DS1 Full Duplex light
 - LED DS2 Voltage Right and LED DS3 Voltage Left lights, if not could it be the fuses F1 and F2 are burned
 - PrimeFlow fuses 10A (F1, F2),
3. All SMCU LED should flash, if not there is no 24V
4. Enter Menu 4.5.3, 4.5.6.4 and 4.5.6.5; check the SMCU for data and/or power errors
5. Reset SMCU error counter
6. If possible turn the nozzles On/Off 5-6 times
7. Enter Menu 4.5.3, 4.5.6.4 and 4.5.6.5 again and check the error log, if there are errors continue faultfinding by reading out the alarm number.

Bus voltage measurements

Turn On the HC6500.

Measure the voltage in the PrimeFlow Junction box PCB terminal J2 L-OUTER.

Terminal			Min. value	Max value	Unit
1	GND	Vcc	23	28	V
2	GND	L-Outer Bus-	2,2	2,5	V
3	GND	L-outer Bus+	2,5	2,7	V
4	L-outer Bus+	L-Outer Bus-	0,2	0,3	V

If the voltage is within the limits and there is a alarm 99, "PrimeFlow data cable weakness" there is a disconnection of the data cables on the boom.

Goto Alarm 99, PrimeFlow data cable weakness, page 90 to find the fault.

If the voltage on Bus+ and/or Bus- are above values; specially if voltage is above 5 volt, a SMCU's has a fault between VCC 24V and the bus wires. If the voltage is below the values there is a short between GND and the bus wires. Then none of the SMCU modules can communicate.

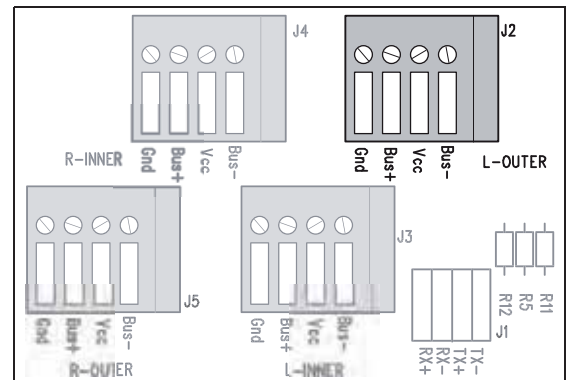
If the Bus+ and Bus- voltage has exact the same value there is a short between these two wires. This can also be seen if the measurements "4" not are within the limits.

Check of chemicals or moisture in connector

Turn Off the HC6500.

Wait until the power supply has discharged, the LED in the SMCU does not light. Measure the same as in the table above, all voltages should be 0.

If they not are 0 there is chemicals in one or several connectors, find and replace the defect parts.



The fault can be found by dividing the boom in parts and measure the voltage until it is inside the limit. Follow the steps below to locate the fault to a single boom part.

Measure the whole boom in the J2 connector, L-OUTER, on the Central Junction Box PCB, see subchapter: "Bus voltage measurements, page 88", for measurements details.

1: Disconnect the right outer boom side.

The right outer boom side stay disconnected during the whole fault finding procedure.

Measure the voltage in terminal J2 L-OUTER.

Is the voltage outside the limit?

Yes: The is a fault on boom

Goto to step 2

No: The system is healthy

2: Divide the boom into two parts by disconnecting the left inner boom.

Measure the voltage in terminal J2 L-OUTER.

Is the voltage outside the limit?

Yes: The fault is on the left boom side.

Goto to step 3

No: The fault is on the right boom side.

Goto to step 5

3: Divide the left boom into two parts by disconnecting a SMCU connector in the middle of left boom side.

Measure the voltage in terminal J2 L-OUTER.

Is the voltage outside the limit?

Yes: The fault is on the left outer boom side. Goto to step 3B

No: The fault is on the left inner boom side. Goto to step 4

3B: Disconnect one by one SMCU from right side of the left outer boom until the measured values are within the limits. The fault is in the last disconnected SMCU or in the SMCU just before.

4: Connect the SMCU from step 3 again

Disconnect one by one SMCU from right side of the left inner boom until the measured values are within the limits. The fault is in the last disconnected SMCU or in the SMCU just before.

5: Connect the left inner boom

6: Disconnect a SMCU connector in the middle of right boom side.

Measure the voltage in terminal J2 L-OUTER.

Is the voltage outside the limit?

Yes: The fault is on the right inner boom side. Goto to step 6B

No: The fault is on the right outer boom side. Goto to step 7

6B: Disconnect one by one SMCU from right side of the inner right boom until the measured values are within the limits. The fault is in the last disconnected SMCU or in the SMCU just before.

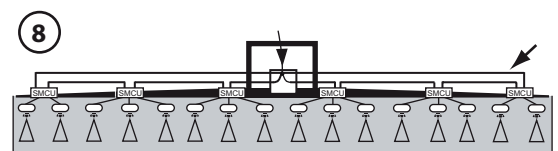
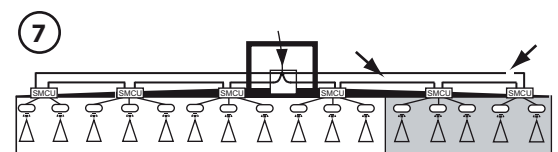
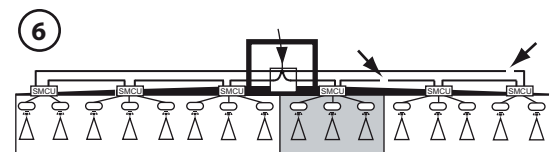
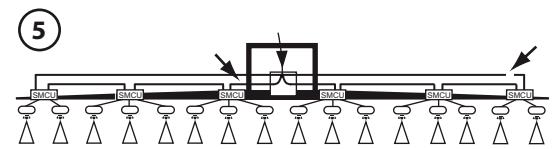
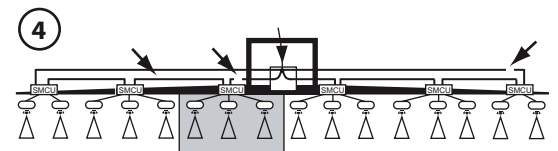
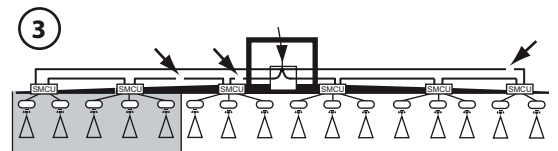
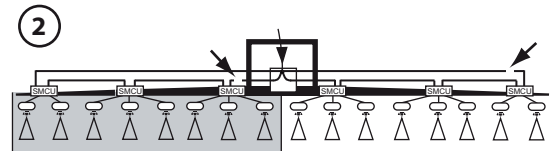
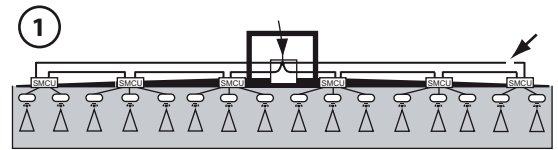
7: Connect the SMCU from step 6 again

Disconnect one by one SMCU from right side of the outer right boom until the measured values are within the limits. The fault is in the last disconnected SMCU or in the SMCU just before.

8: Connect the outer right boom side

Measure the voltage in terminal J2 L-OUTER.

All voltages should be within the limit now.



13 - PrimeFlow

PrimeFlow alarms

Alarm 99, PrimeFlow data cable weakness

The alarm 99 occurs when there is a fault in the data communication line between the JobCom and the parts in the rear of the sprayer; Central junction box PCB and or the SMCU on the boom.

The fault can be a disconnection in the data communication line, a short between two lines, power to data or between the two data lines. It can also be caused of water or chemicals in a connector that acts as a short or a battery that draw the data line voltage out of the range where it is healthy.

The fault finding procedure and localization of the fault is mainly to check the test menus in the work screen and some measurement on the central junction box PCB or the connectors on the boom.

It is also important visually to inspect the cables and connectors for marks and water/chemicals, if there are any damages replace by new parts.

PrimeFlow data cable weakness	Area spray	Prog. rate
	0 hectare	200 Litre/ha
	Tank cont.	Work rate
	4400 litre	0.00 ha/hour

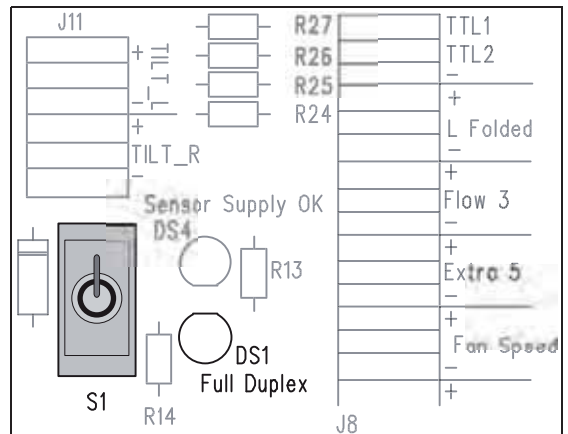
Check of 37 pole cable from JobCom to PrimeFlow junction box

Move switch S1 lever up to Half Duplex position; LED DS1 is Off.
Turn the HC6500 Off and On again.

If Alarm 99 still occurs with the setting Half Duplex position:

- The 37 pole cable from JobCom to PrimeFlow junction box is faulty.
- Short circuit in PrimeFlow junction box pcb or cables and SMCU's on the boom.

If Alarm 99 does not occurs now, the fault is isolated to a disconnection in the PrimeFlow junction box, cables and SMCU's on the boom.
Move switch lever down to Full Duplex position again.



Disconnect the cable to the Right Outer boom.

Turn On the system

Enter menu 4.5.6.4 Count of data error

Reset the counter

The counter is only counting when there is no connection on the data line. If there is a short circuit between two cables the counter will not count.

Check out the counter, the fault is on the first SMCU that count up errors or in the connection to the SMCU prior to the SMCU that is counting errors.

In this example is it SMCU number 5.

Inspect the connector from SMCU no.4 if it is healthy replace SMCU no. 5.

4.5.6.4 Count of data error										
1:	0	0	0	0	55	55	55	55	55	55
11:	55	55	55	55	55	55				
21:										
-->										
41:										
51:										
61:										
71:										
81:										
Times were SMCU did not respond to alive telegram. C to reset counters										

If all the SMCU is counting faults is it the connection between the central junction box PCB and the first SMCU on the left boom side that has a fault or the first SMCU itself that is faulty.

Reset the counter and check out that all the counters stays on zero.


Use Bus voltage measurements, page 88 to find the fault.

Alarm 100 Low PrimeFlow voltage

JobCom measure PrimeFlow supply voltage after the fuse for the left and right boom.

Alarm occur when voltage is below 14 volts at the Centrale junction box PCB.

Fuse F1 and/or F1 is open.

 !100		
low PrimeFlow voltage	Area spray 0 hectare	Prog. rate 200 Litre/ha
	Tank cont. 4400 litre	Work rate 0.00 ha/hour

Warning 101 PrimeFlow power cable defect

Low power warning from SMCU, when power supply to SMCU is reestablished. Occurs when one or more SMCU is rebooted without the JobCom is rebooted.

This can only be caused by an unstabel power supply to the SMCU.

- If the whole boom is failing:
 - 12-24VDC step-up transformer is defect
 - Centrale junction box PCB is defect
 - 24VDC cable from JobCom is defect
- If a half boom side is failing:
 - Centrale junction box PCB is defect
 - Centrale junction box fuse holder is defect
- If one single SMCU is failing:
 - Poor power supply connection on that specific SMCU; male or/and female connector
 - Internal SMCU failure

First low power warning received after power up of system is not valid.


First low power warning received after "Low voltage on supercap" is not valid.

Poor power wiring to PrimeFlow computers. One of the two power lines to each of the boom sides are disconnected or connectors are corroded and gives high resistance.

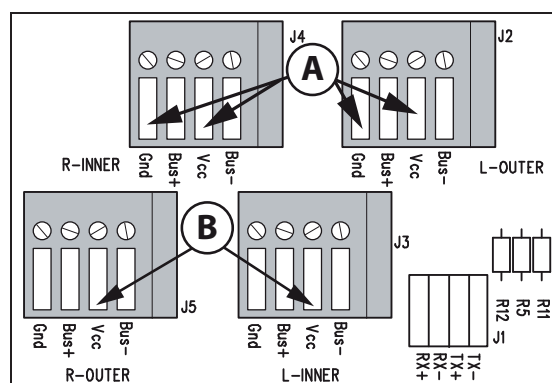
Find the boom part with short circuit.

Dismount the Gnd and Vcc in the upper screw terminal blocks A.

Keep the Vcc, in the lower screw terminal blocks B mounted.

 !101		
PrimeFlow power cable defect	Area spray 0 hectare	Prog. rate 200 Litre/ha
	Tank cont. 4400 litre	Work rate 0.00 ha/hour

Mounted	Dismounted	Max value
Measure between		Ohm
L-Inner Gnd	L-Outer Gnd	2
L-Inner Vcc	L-Outer Vcc	2
R-Inner Gnd	R-Outer Gnd	2
R-Inner Vcc	R-Outer Vcc	2







13 - PrimeFlow

Warning 102 PrimeFlow computer defect

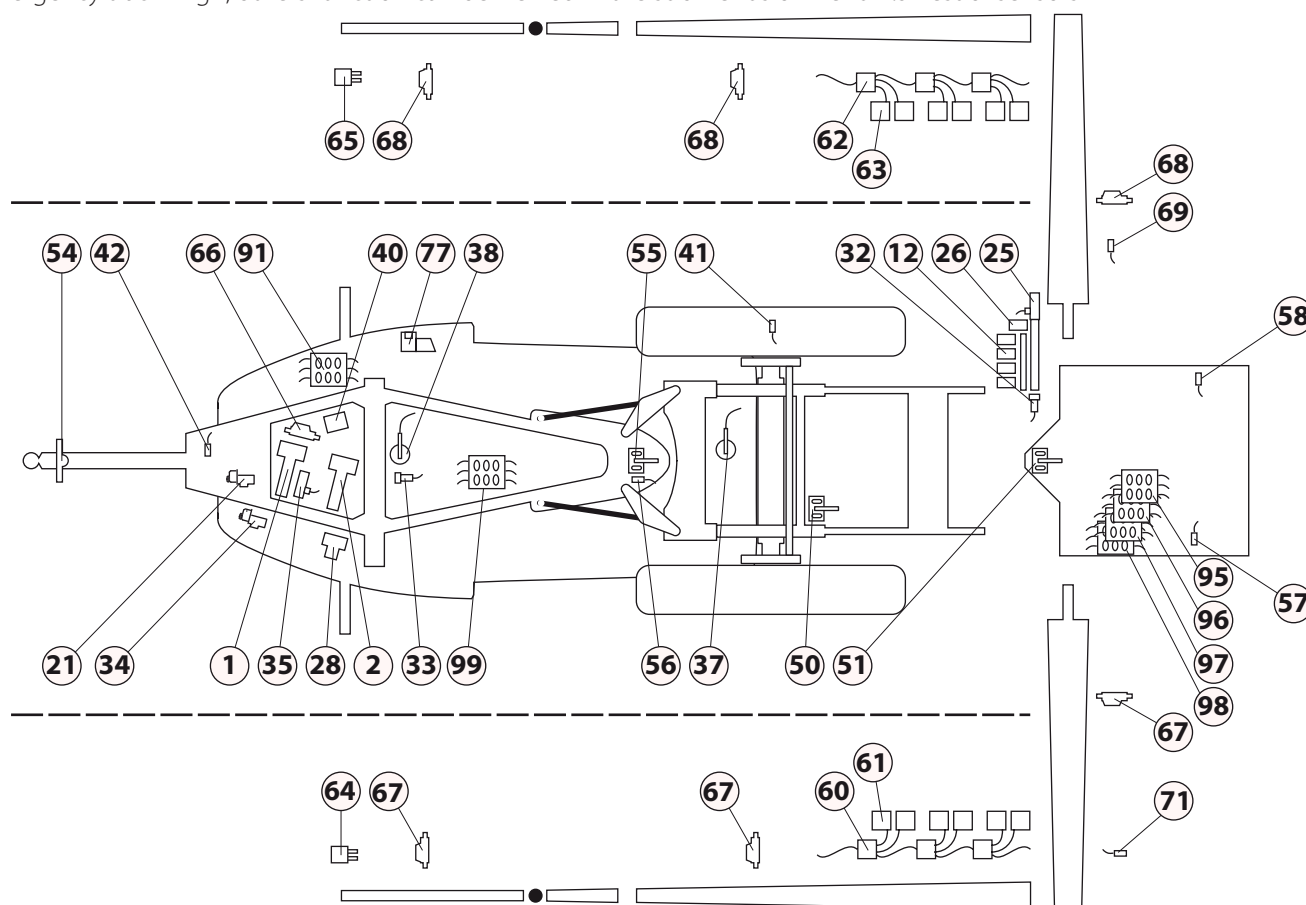
SMCU does not reply on status.
No status request while "Low voltage on supercap" occurs.
Internal fault in PrimeFlow computer.
Can also be caused by two or more defects in PrimeFlow data or power cable.
Check for PrimeFlow data and power cable weakness.

Fault find by using the chapter PrimeFlow test menus, page 85.

<div>auto    </div> <div><div>!102</div><div></div></div>		
PrimeFlow computer defect	Area spray 0 hectare	Prog. rate 200 Litre/ha
	Tank cont. 4400 litre	Work rate 0.00 ha/hour

Sensors location

A complete list of sensors on HARDI COMMANDER sprayers. The function of some sensors can be viewed in menu 4.7 Emergency track Align, others function can be viewed in the submenus of menu 4.5 Test of sensors



# No	Description	# Con. point	Page		# Con. point	Page
1	Suction SmartValve	91-17DO	97/99	57	Boom sensor Left	98-2 100
2	Pressure SmartValve	91-17PE	97	58	Boom sensor Right	91-17Q 97/99
12	Distribution valves	95-9/96-8	100/100	60	PrimeFlow SMCU Left	97-1
21	Pressure control valve	91-17A	97/99	61	PrimeFlow step motor Left	60
25	Boom flow meter	95-4/96-4	100/100	62	PrimeFlow SMCU Right	97-1
26	Boom bypass valve	95-7/96-6	100/100	63	PrimeFlow step motor Right	62
28	External fast filling valve	91-17VF	97/99	64	End nozzle Left	95-5/96-5 100/100
32	Pressure sensor	95-1/96-1	100/100	65	End nozzle Right	95-5/96-5 100/100
33	Main tank gauge	91-17V	97/99	66	TWIN fan speed actuator	91-17X 97/99
34	AutoAgitation valve	91-17CK	97/99	67	TWIN angle actuator Left	91-17W 97/99
35	RinseTank flow meter	91-17R	97/99	68	TWIN angle actuator Right	91-17W 97/99
37	RinseTank full sensor	91-17T	97/99	69	TWIN Fan speed sensor	95-2/96-2/97-8 100/100/101
38	Main tank full sensor	91-17S	97/99	77	Foam marker compressor	91-17M 97/99
40	Boost line valve	91-17G	97/99	91	JobCom	97
41	Forward speed sensor	95-3/96-3	100/100	93	DAH PCB	88
42	PTO Pump speed sensor	91-17i	97/99	95	9 sec. Centrale Junction box PCB	91-8 97
50	Paralift height sensor	91-17L	97/99	96	13 sec. Centrale Junction box PCB	91-8 97
51	Slant angle sensor	98-3	100	97	PrimeFlow Cent. Junction box PCB	91-7+8 97
54	SafeTrack front sensor	91-17N	97/99	98	HY Cent. Junction box PCB	91-6 97
55	SafeTrack rear sensor	201-J7	108	99	Dilution kit box PCB	91-12/17G 97
56	SafeTrack lock sensor	201-J6	108			

14 - Sensors

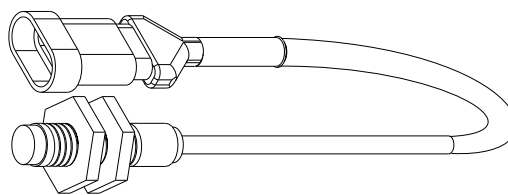
Pinning/plugs/colors/codes

General:

	Angle sensor	Sensor	AMP Connector	PCB
Blue	Signal	Signal	3	Signal
Black	GND	GND	1	-
Brown	+12V	+12V	2	+

Speed #41, TWIN #69, Boom #57/58 and SafeTrack lock #56 sensor

Hardi P/N 28047500
Type: Inductive
Range: 0-8mm
Signal: Passive high 12VDC. Active low 0,8VDC
Operation indicator: Yellow LED when active
Power: 9-15VDC



Operating element:
Electroconductive metal

Measurements:

Disconnect the sensor plug.

Measure power supply between pin 1 and 2 on the connector of the cable harness. The voltage should be 12VDC or the same as the main power supply on the sprayer.

Measure signal voltages between pin 1 and 3 on the connector of the cable harness. The voltage should be 0VDC. If not is there a short in the cable.

Connect the sensor to the cable harness.

Measure the power supply between pin 1 and pin 2. The voltage should be 12VDC or the same as the main power supply on the sprayer.

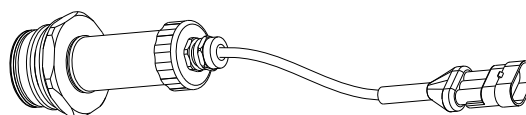
Measure the signal voltage between pin 1 and 3.

The signal voltage should be the same as the power supply voltage when the sensor not is active, no light in the sensor indicator.

When the sensor is active, light in the indicator, should the voltage be 0,8VDC.

Tank gauge #33

Hardi P/N 26014100
Type: Pressure
Range: 0-250mBar
Signal: 100-2600Hz, open collector NPN
Pull up: 10K Ohm to Vcc
Power: 12V



Angle sensors

Applications:

Measurements of angles of the draw bar, rear axle and boom slant.

Measurements:

Disconnect the sensor plug.

Measure power supply between pin 1 and 2 on the connector of the cable harness. The voltage should be 12VDC or the same as the main power supply on the sprayer.

Measure signal voltages between pin 1 and 3 on the connector of the cable harness. The voltage should be between 0VDC. If not is there a short in the cable.

Connect the sensor to the cable harness.

Measure the power supply between pin 1 and pin 2. The voltage should be 12VDC or the same as the main power supply on the sprayer.

Measure the signal voltage between pin 1 and 3.

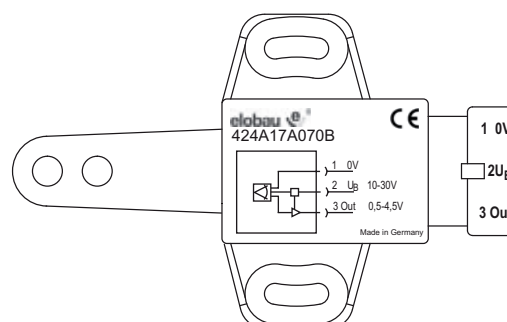
If the flat side of the axle faces the connector, the middle position, the voltages should be about 2,5VDC. In the outer positions should it read from 0,5 to 4,5VDC.

The voltage and angle can also be readout in the HC 6500 test menu. The front and rear angle sensor can be found in Track sensor test menu 4.5.4.6.

If the behaviour of the voltages is different, the sensor is defective and must be replaced.

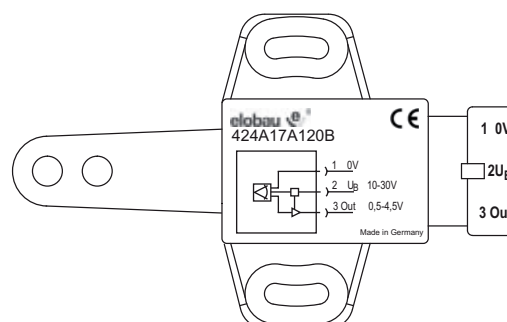
Front angle sensor #54

Hardi P/N	26005700
Type:	Potentiometer
Range:	0-70°
Signal:	0,5 - 4,5V
Centre position:	2,5 V
Power:	12V



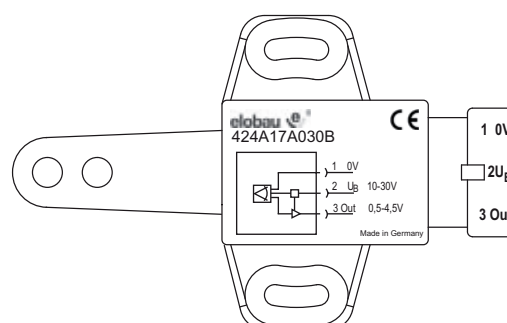
Track rear #55 and Paralift #50 angle sensor:

Hardi P/N	26005800
Type:	Potentiometer
Range:	0-120°
Signal:	0,5 - 4,5V
Centre position:	2,5 V
Power:	12V



Slant angle #51 sensor:

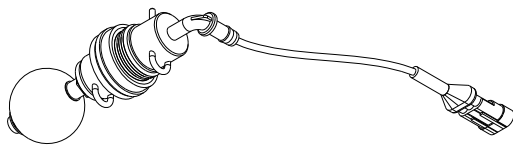
Hardi P/N	26014300
Type:	Potentiometer
Range:	0-30°
Signal:	0,5 - 4,5V
Centre position:	2,5 V
Power:	12V



14 - Sensors

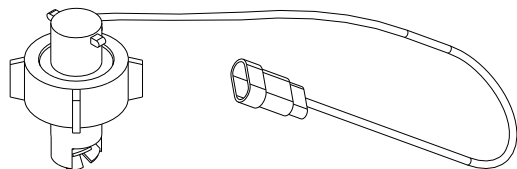
Tank full switch #38

Hardi P/N	72411300
Type:	Switch
Full tank:	Switch open
Not full tank:	Switch closed, <2.0 ohm
Power:	12V



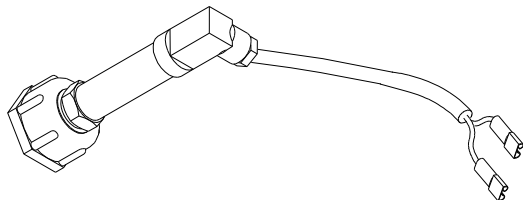
Flow #25/#35 sensor:

Hardi P/N	72117500
Type:	Inductive
Range:	On, 0,2-0,5 V Off, 6,5-7,0 V
Visual indicator:	Red light when Off (0,8V)
Power:	12V



Pressure #32 sensor:

Hardi P/N	CM05	72565100
	NAV07	72555000
	No fittings	26026200
Type:	Pressure	
Range:	0-10 Bar	
Signal	4-20mA	
Power:	8-30V	



Pressure sensor setup

The boom pressure sensor is setup in menu E8.1.7.

Default setting for the sensor is "passive".
If the sensor is set to passive it can only be used for read out purpose.

i NOTE: Minimum pressure in Menu E8.1.3 is not influenced of the settings in menu E8.1.7.1

Select "active" when the sensor should be used for regulation at low flow.

Display readout setup
For a readout on the HC6500, the sensor must be setup.
To show the pressure in the upper middle window select E.2.1.1.11.

Alarms:
Alarm 109; pressure sensor:
The alarm is generated, if the sensor signal is shorted or not connected.

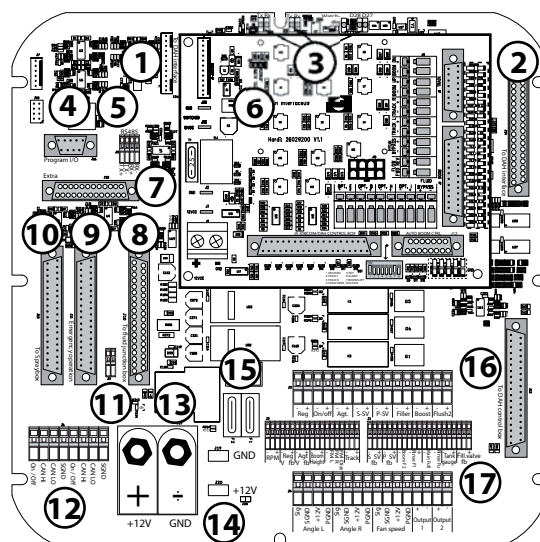
The HC6500 has min. and max pressure alarm that can be shown in the display.
The display need to be set up to show this alarm.

E8.1.7.1 Pressure		
»	E8.1.7.1.1	Pressure sensor: Passive
	E8.1.7.1.2	Pressure sensor: Active
Pressure sensor used for read out purpose only		

2.1.1 Show upper middle		
»	2.1.1.07	Speed
	2.1.1.08	Volume sprayed
	2.1.1.09	Area sprayed
	2.1.1.10	Active boom size
® »	2.1.1.11	Pressure
	2.1.1.12	Fan speed
	2.1.1.13	Wind speed
	2.1.1.14	Wind direction
	2.1.1.15	Humidity
Displays spray pressure if sensor is fitted		

JobCom #91 connections

1. To DAH interface, DAH Hydraulic PCB connection
2. To DAH interface, DAH Hydraulic PCB connection
3. JobCom status LED
4. Program I/O, communication port, RS232
5. RS485, communication port
6. Direct Activated Hydraulic, DAH, PCB
7. Extra, PrimeFlow Centrale Junction Box connection
8. To fluid junction box, 9 or 13 sec. PCB
9. Emergency operation. Only HC 5500 System
10. To Spraybox. Only HC 5500 System
11. TankGauge connector. Only HC 5500 System
12. CAN Bus connection
13. Power Supply
14. Optional Power Supply connection, out
15. TWIN Fuses
16. To DAH control box. Only HC 5500 System
17. TWIN, Sensors, valves and optional connections

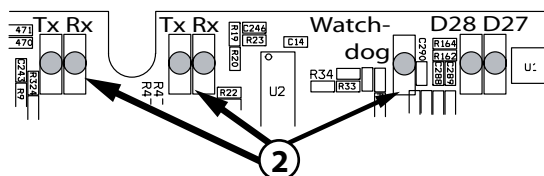


1 - 2. DAH Hydraulic PCB connection

Interconnection between JobCom and DAH Hydraulic PCB. J8 on JobCom to J5 on DAH PCB and J14 on JobCom to J4 on DAH PCB.

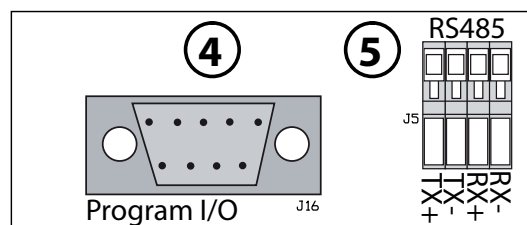
3. JobCom status LED

The LED indicates the condition and status of the JobCom, see the CAN-BUS chapter for a detail description of the blink code.



4 - 5. Communication ports

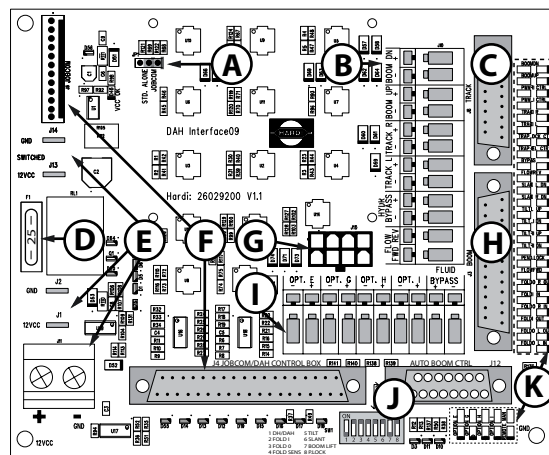
4. Program I/O communication port, RS232 used for software upload to the JobCom
5. RS485 communication port for PrimeFlow, not used



14 - Sensors

6. Direct Activated Hydraulic, DAH, PCB #93

- A. Configuration of PCB to be used as stand alone or combined with a JobCom.
- B. BOOM DN and UP is controlling the ParaLift. TRACK L and R is the same as in J6 connector. HYDR BYPASS open and close the open centre hydraulic valve. This function is controlled from the AutoHeight device connected to J12. FLOW FWD and REV is not used.
- C. Connection to Track Cable harness #201
- D. Fuse: 1x25AT ATO blade fuse
- E. Power output connectors for PrimeFlow and AutoHeight etc.
- F. Connections to JobCom J8 and J14
- G. AutoHeight resistor board connector
- H. Connection to HY Centrale Junction Box PCB #98
- I. OPT. E, G, is used on a HC 5500 System only
OPT. H and I, HC 6400 A/B switch setup, is done in menu E8.5.4 .
Menu E8.5.4.3 Hydraulics DAH: OPT H +12V when B is selected, OPT I +12V when A is selected. 0V when no button is held in.
Menu E8.5.4.4 Hydraulics Delta DH: OPT H and OPT I +12V when A or B button is selected. 0V when no button is held in.
FLUID BYPASS is used with AutoHeight
- J. Auto boom control connection and DIP switches for configuration of AutoHeight. See AutoHeight Installations Manual for details.
- K. Function status LED



7. Extra connector

DB25F connector.
Connection to PrimeFlow Centrale Junction box PCB#97 connector with JobCom to Primeflow PCB cable #203.

8. To fluid junction box

DB37F connector.
Connection to 13 section Centrale Junction box #96, 9 section Centrale Junction Box #95 or PrimeFlow Centrale Junction Box PCB #97 with "JobCom to 13 sec. PCB cable" #208, "JobCom to 9 sec. PCB cable" #209 or "JobCom to Primeflow PCB cable" #203.

9. Emergency operation

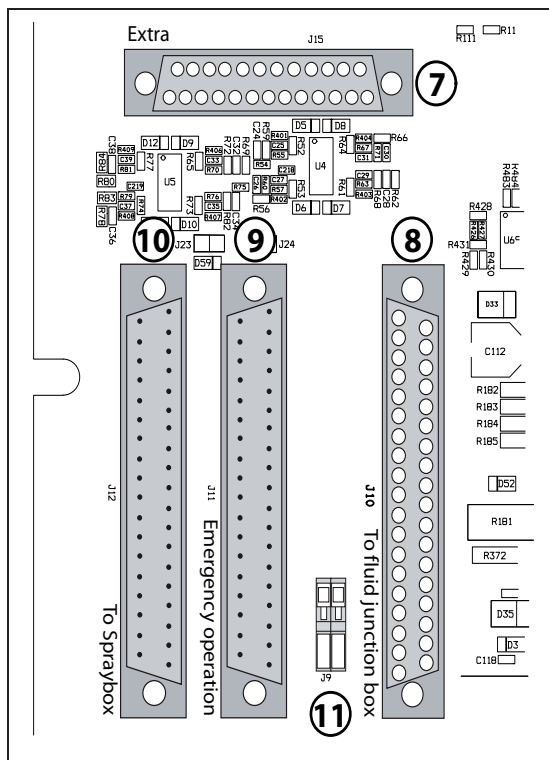
HC 5500 System only

10. To Spraybox

HC 5500 System only

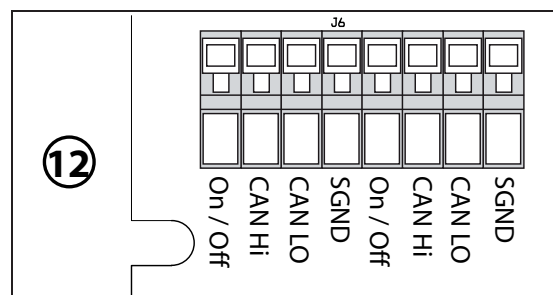
11. TankGauge connector

HC 5500 System only



12. CAN Bus connection

Functions	Colors	wires:
CAN HI	Yellow	To CAN Hi
CAN LO	Green	To CAN Lo
On / Off	Blue	To On / Off
SGND	SGND	Not used



13. Power Supply

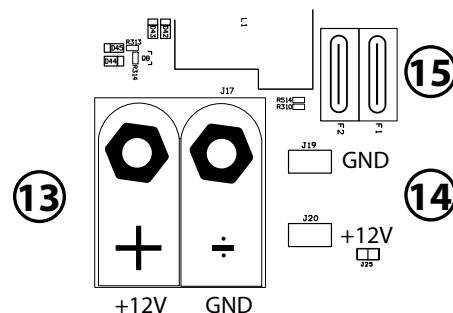
Main power supply connector.
Connected to "JobCom to tractor cable" #206.

14. Optional Power Supply connection, out

Spade power supply connector for optional equipment

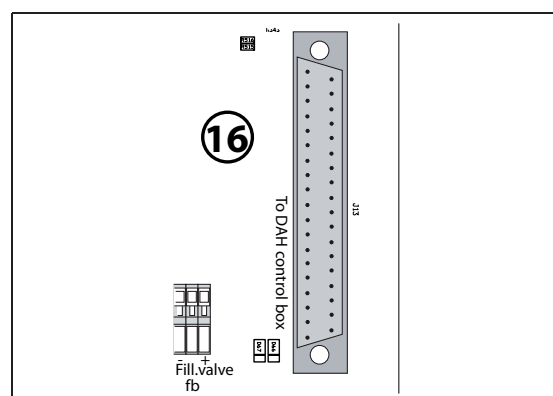
15. TWIN Fuses

10A spade fuses for TWIN actuators left and right.



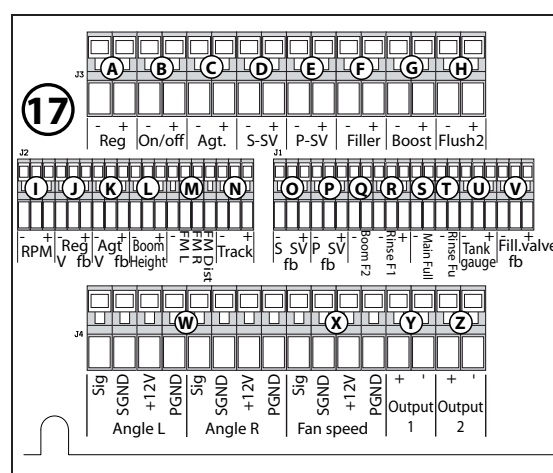
16. To DAH control box

HC 5500 System only



17. TWIN, Sensors, valves and optional connections

- Power supply connection for Pressure Reg. valve #21
- Not used
- Power supply connection for Agitation valve #34
- Power supply connection for Suction smart valve #1
- Power supply connection for Pressure smart valve #2
- Power supply connection for Fast filling valve #28
- Dilution kit
- Optional function A and B on SetBox HC 6400. See menu E8.5.4.2 Valve or lamp
- RPM. Pump revolution sensor #42
- Pressure Regulation valve connection #21
- Agitation valve connection #34
- Boom Height (Paralift) angle sensor #50
- Foam marker connections
- Front track angle sensor #54
- Suction smart valve connection #1
- Pressure smart valve connection #2
- Boom sensor right #59
- Rins tank flow sensor #35
- Main tank full full switch #38

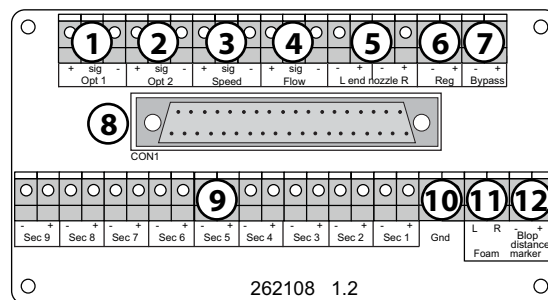


- Rinse tank full switch #37
- Tank gauge sensor #33
- Fast filling valve #28
- TWIN angle actuator left and right connections #67,68
- Fan speed actuator connection #66
- Not used
- Not used

14 - Sensors

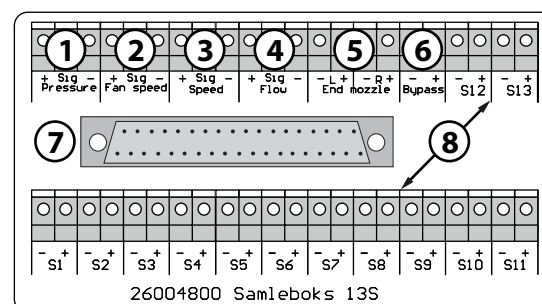
9 section Centrale Junction box PCB #95

1. Opt 1. Pressure sensor #32
2. Opt 2. TWIN Fan speed sensor #69
3. Speed. Speed sensor #41
4. Flow. Boom flow sensor #25
5. End nozzle. Left and Right end nozzle
6. Reg. Regulation valve (only sprayers without JobCom)
7. Bypass. Bypass valve #26
8. CON1. Connection to JobCom with "JobCom to 9 sec. PCB" cable #209
9. Sec 1 - Sec 9. Section valve connections #12
10. GND. Ground connector
11. Foam. Foam marker (only sprayers without JobCom)
12. Blop distance marker (only sprayers without JobCom)



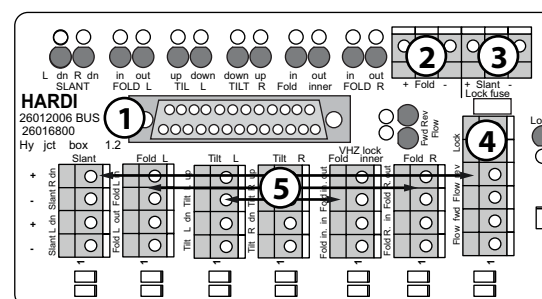
13 section Centrale Junction box PCB #96

1. Sig Pressure. Pressure sensor #32
2. Sig Fan Speed. TWIN Fan speed sensor #69
3. Sig Speed. Speed sensor #41
4. Sig Flow. Boom flow sensor #25
5. End nozzle. Left and Right end nozzle
6. Bypass. Bypass valve #26
7. Connection to JobCom with "JobCom to 13 sec. PCB" cable #208
8. S1 - S13. Section valve connections #12



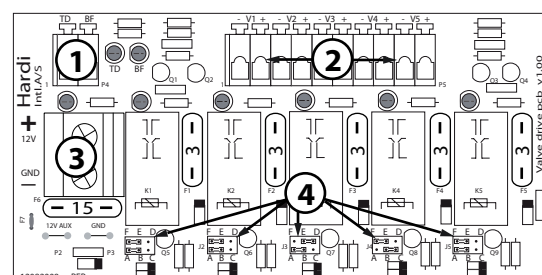
HY Centrale Junction box PCB #98

1. Connection to JobCom DAH PCB with "JobCom DAH to HY PCB" cable #202
2. Boom fold sensor right; sensor #58
3. Slant angle sensor; sensor #51
4. Pendulum lock
5. Connection to Boom HY block



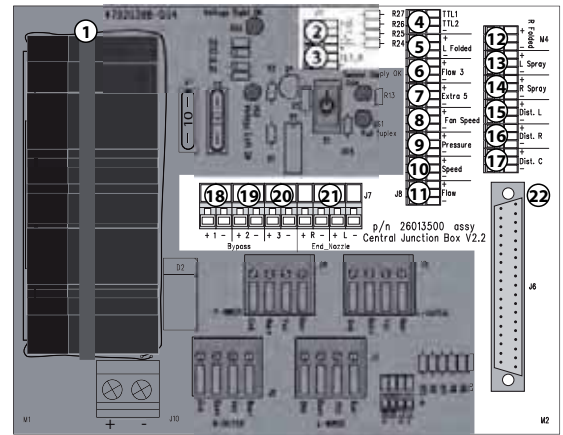
Dilution kit PCB #99

1. Connection to JobCom 17G
2. Dilution kit valves V1,V2,V3,V4,V5
3. Power supply connection to JobCom 13
4. Configurations jumpers

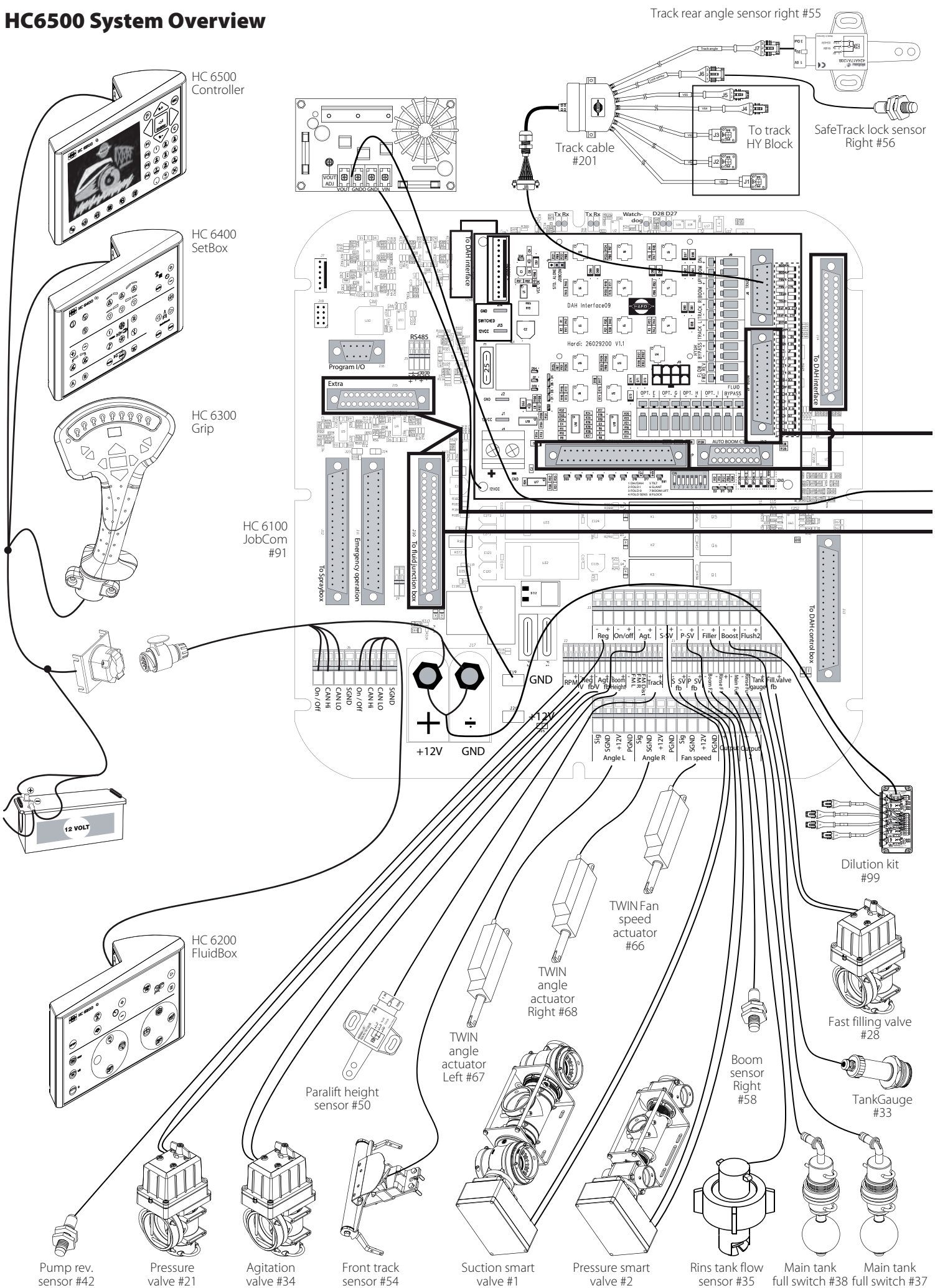


PrimeFlow Centrale Junction box PCB #97

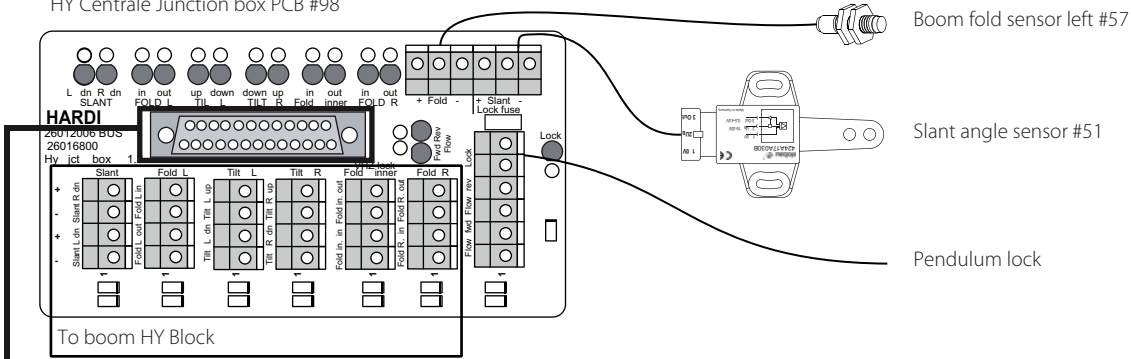
1. The gray part of the PCB is PrimeFlow functions that are described in the PrimeFlow chapter
2. TILT L. Boom tilt function
3. TILT R. Boom tilt function
4. Not used
5. L Folded. Left boom fold
6. Flow 3. Not used
7. Extra 5. Not used
8. Fan Speed. TWIN fan speed sensor #69
9. Pressure. Pressure sensor #32
10. Speed. Speed sensor #41
11. Flow. Boom flow sensor #25
12. R Folded. Boom fold sensor right in transport #58
13. L Spray. Boom fold sensor left unfolded #71
14. R Spray. Boom fold sensor right unfolded #75
15. Dist. L. Not used
16. Dist. R. Not used
17. Dist. C. Not used
18. Bypass 1. Bypass valve 1 #26
19. Bypass 2. Bypass valve 2 #26
20. Bypass 3. Bypass valve 3 #26
21. End Nozzle. Left and Right endnozzles
22. Connection to JobCom with "JobCom to Primeflow PCB cable" #203



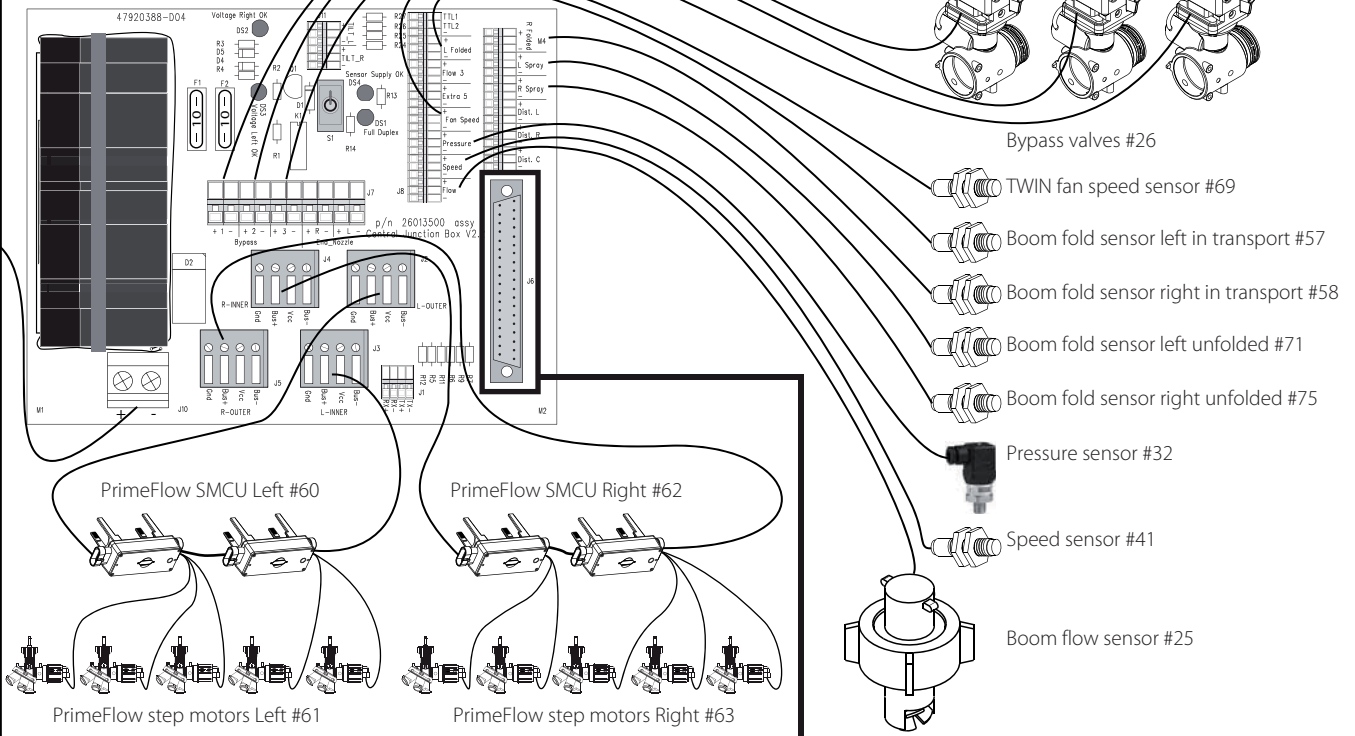
HC6500 System Overview



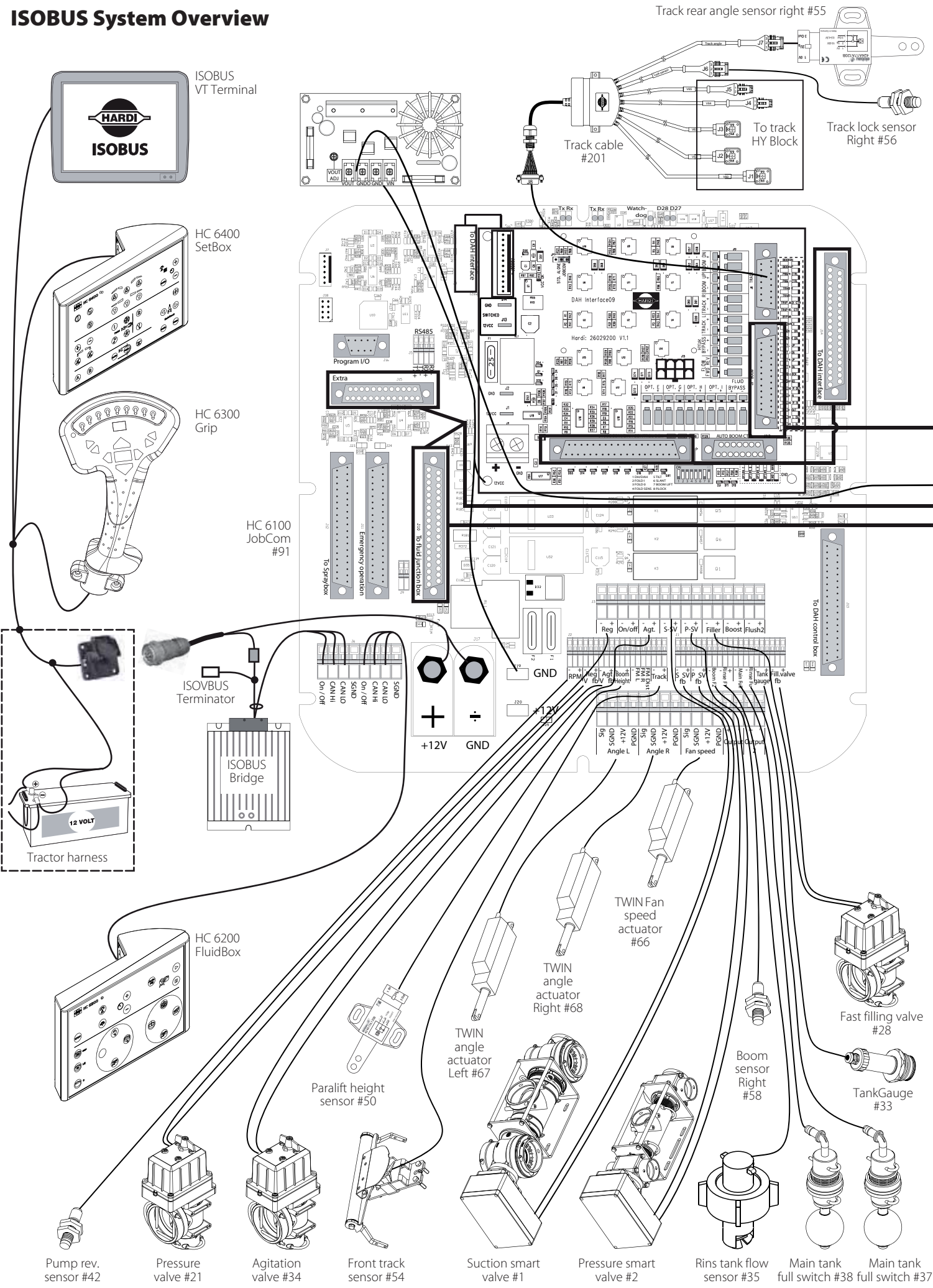
HY Centrale Junction box PCB #98



Option: PrimeFlow Centrale Junction box PCB #97



ISOBUS System Overview



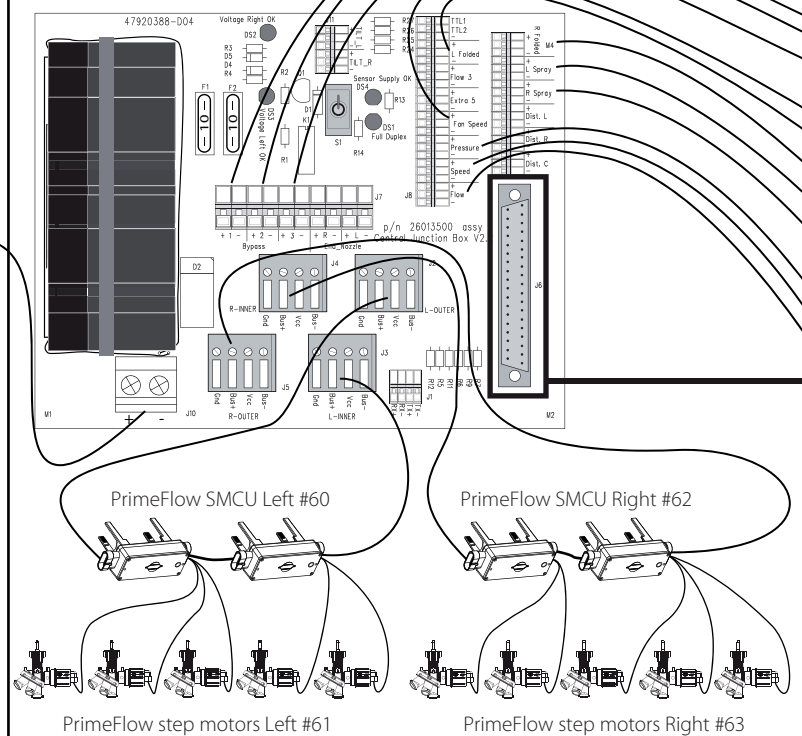
HARD

26012006 BUS
26016800
Hy lct box 1

The diagram illustrates the hydraulic connections for the boom system. At the top, there are two rows of circular symbols representing hydraulic ports. The first row has eight ports labeled from left to right: "SLANT", "in out", "up down", "down up", "TILT R", "in out", "Fold inner", and "FOLD R". Above each port is a small circle. Below the first row is a second row of eight ports labeled: "SLANT", "FOLD L", "Tilt L", "Tilt R", "Fold inner", "Fold R", "Flow", and "Lock". To the right of these ports are three rectangular boxes representing hydraulic components: a 2x4 grid of circles, a single circle, and another 2x4 grid of circles. Arrows indicate flow directions between these components and the ports. A legend at the bottom right shows a circle with a dot for "Flow", a solid black circle for "Lock", and a rectangle for "Fuse".

Pendulum lock

Option:
PrimeFlow Centrale
Junction box PCB #97



Boom flow sensor #25

	F
--	---

Distribution
valve 1-13
#12

Pressure sensor #32

TWIN fan sensor #69

Speed sensor #41

Boom flow sensor #25

Boom flow sensor #25

Bypass valve #26

Distribution valve 1-9 #12

CON1

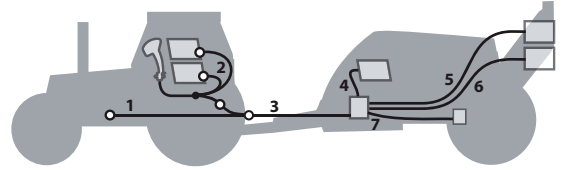
262108 1.2

Bypass
valve
"2.5"

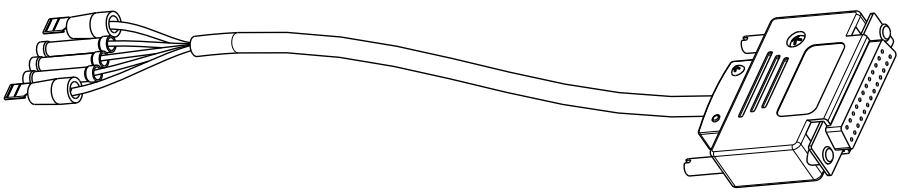
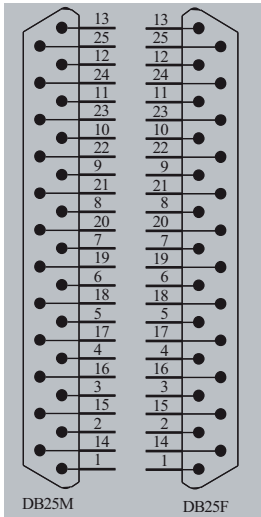
Distribution
valve 1-9
#12

262108 1.2

1. Battery to cabin cable; page 113
2. Cable from terminal to cabin ; page 112
3. JobCom to cabin cable ; page 113
4. JobCom to HC6600 Fluid box cable ; page 107
5. JobCom to 13 sec PCB; page 114 or PrimeFlow pcb; page 111
6. JobCom to HY PCB ; page 110
7. SafeTrack cable ; page 108

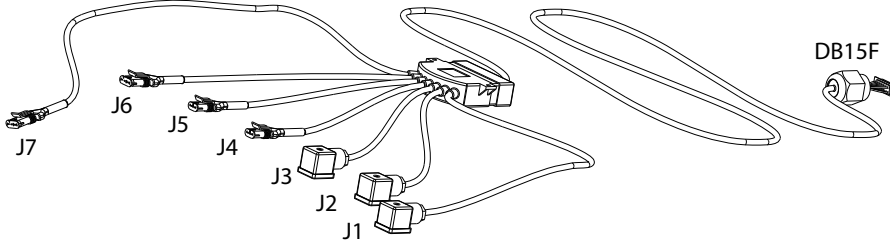
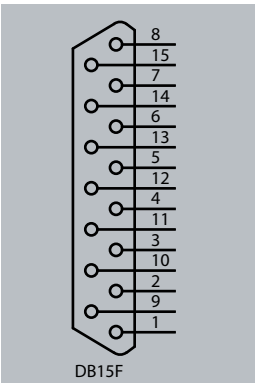


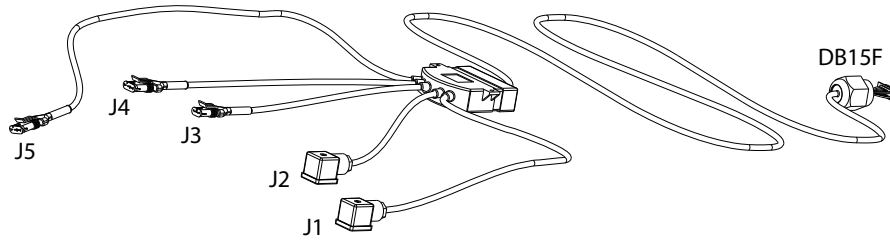
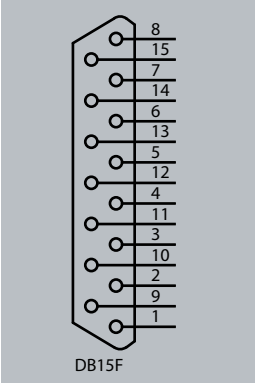
JobCom to HC6600 FluidBox cable

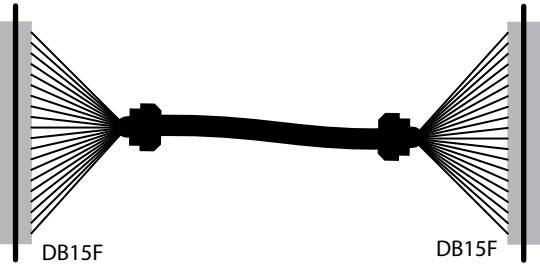
				Length meter	Part number
				1,8	26014800
DB25F	Colour	Function	JobCom		
1		NC			
2		NC			
3		NC			
4		NC			
5		NC			
6		NC			
7	Green	CAN Low	J6 CAN Low		
8		NC			
9	Blue	Power ON	J6 On/Off		
10		NC			
11	Black	12V	J20 +12V		
12		NC			
13	Red	GND PWD	J19 GND		
14		NC			
15		NC			
16		NC			
17		NC			
18		NC			
19	Yellow	CAN High	J6 CAN High		
20		NC			
21		NC			
22		NC			
23		NC			
24	Brown	12V	J20 +12V		
25	Orange	GND PWD	J19 GND		

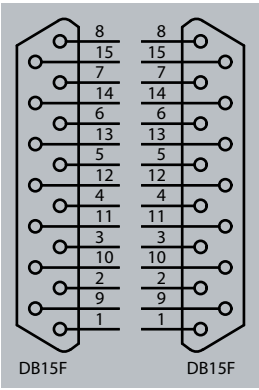
15 - Cables

Track Cable #201

					Length meter	Part number
					4,5	26024000
					Mounted with screw kit 3M Thread: 4-40 UNC	
15-PoleF	Colour	Function	Conector	Colour		
1	Black	Sensor GND	J6, J7	Black		
2	Brown	+12V	J6, J7	Brown		
3	Red	Track locked sensor	J6	Blue		
4	Orange	PWM L	J2	Brown		
5	Yellow	GND	J1, J2, J3, J4, J5	Blue		
6	Green	GND	J1, J2, J3, J4, J5	Blue		
7	Blue	Track L	J5	Brown		
8	Violet	Trapeze lock	NC	-		
9	Gray	Rear track sensor	J7	Blue		
10	White	Boom height	NC	-		
11	Pink	PWM R	J3	Brown		
12	Light Blue	GND	J1, J2, J3, J4, J5	Blue		
13	Light Green	GND	J1, J2, J3, J4, J5	Blue		
14	White/Black	Track R	J4	Brown		
15	White/Brown	Trapeze release	J1	Brown		

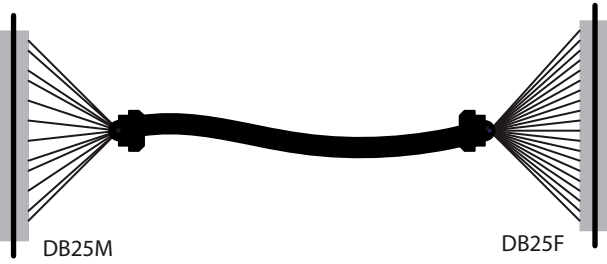
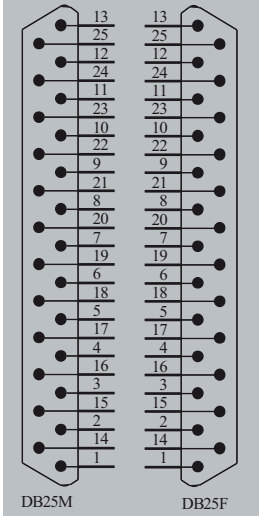
					Length meter	Part number
					4,5	26024100
					Mounted with screw kit 3M Thread: 4-40 UNC	
15-PoleF	Colour	Function	Conector	Colour		
1	Black	Sensor GND	J5	Black		
2	Brown	+12V	J5	Brown		
3	Red	Track locked sensor	NC	-		
4	Orange	PWM L	J1	Brown		
5	Yellow	GND	J1, J2, J3, J4	Blue		
6	Green	GND	J1, J2, J3, J4	Blue		
7	Blue	Track L	J4	Brown		
8	Violet	Trapeze lock	NC	-		
9	Gray	Rear track sensor	J5	Blue		
10	White	Boom height	NC	-		
11	Pink	PWM R	J2	Brown		
12	Light Blue	GND	J1, J2, J3, J4	Blue		
13	Light Green	GND	J1, J2, J3, J4	Blue		
14	White/Black	Track R	J3	Brown		
15	White/Brown	Trapeze release	NC	-		

				Length meter	Part number
				4,5	26007500
				The track cable P/N 26007500 has been replaced by track cable set P/N 26024000 for CM and 26024100 for NAV.	
15-PoleF	Colour	Function	15-PoleF	Mounted with screw kit 3M Thread: 4-40 UNC	
1	Black	Sensor GND	1		
2	Brown	+12V	2		
3	Red	Track locked sensor	3		
4	Orange	PWM L	4		
5	Yellow	GND	5		
6	Green	GND	6		
7	Blue	Track L	7		
8	Violet	Trapeze lock	8		
9	Gray	Rear track sensor	9		
10	White	Boom height	10		
11	Pink	PWM R	11		
12	Light Blue	GND	12		
13	Light Green	GND	13		
14	White/Black	Track R	14		
15	White/Brown	Trapeze release	15		

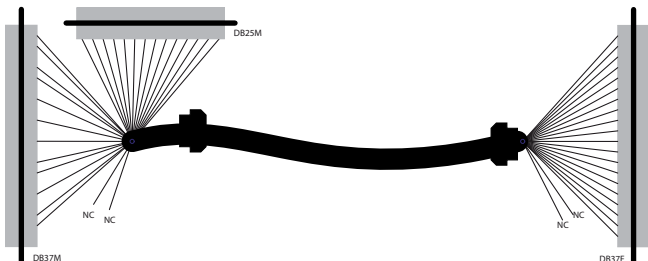
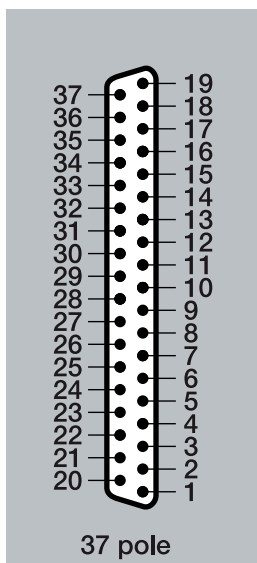


15 - Cables

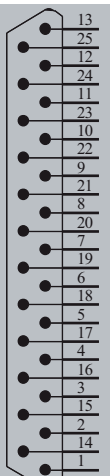
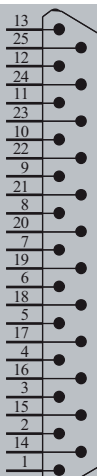
JobCom DAH PCB to HY PCB cable

				Length meter	Part number
				8,5	26016900
				Mounted with screw kit 3M Thread: 4-40 UNC	
DB25M	Colour	Function	DB25F		
1	White	Flow reverse	14		
2	Green	Lock	9		
3	Grey	Slant sensor	2		
4	Blue	GND Sensor	16		
5	Black	Fold Sensor	1		
6	Grey/Pink	+12V Sensor	15		
7	White/Green	GND	17		
8	White/Yellow	GND	22		
9	White/Grey	GND	18		
10	White/Pink	GND	19		
11	White/Blue	GND	20		
12	White/Red	GND	21		
13	White/Black	Slant R dn	4		
14	Brown	Flow forward	10		
15	Yellow	Fold R out	23		
16	Pink	Fold R in	24		
17	Red	Fold inner out	12		
18	Violet	Fold inner in	11		
19	Red/Blue	Tilt R up	7		
20	Green/Brown	Tilt R down	8		
21	Yellow/Brown	Tilt L down	6		
22	Grey/Brown	Tilt L up	5		
23	Pink/Brown	Fold L out	25		
24	Brown/Blue	Fold L in	13		
25	Brown/Red	Slant L dn	3		
Technical data:					
Working temp	0-70 deg C				
Voltage rating	>50 V				
Multi-wire	Colour-coded				

JobCom to PrimeFlow PCB cable

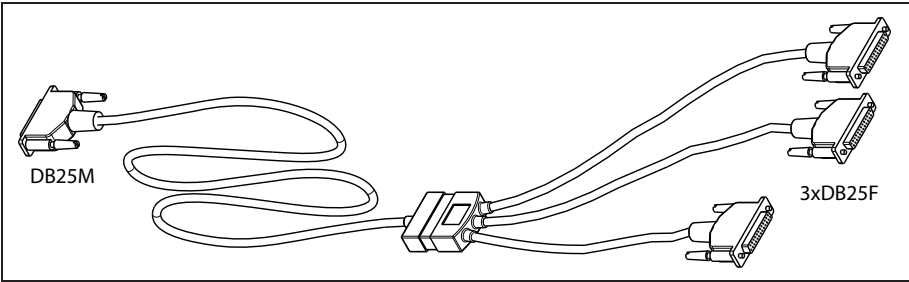
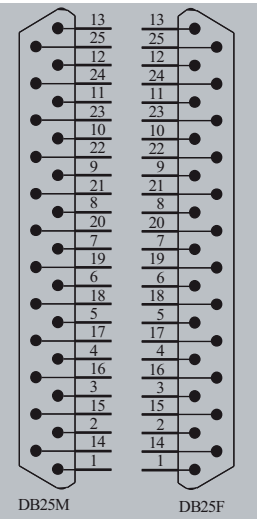
					Length meter	Part number
					9,5	26015000
					Mounted with screw kit 3M Thread: 4-40 UNC	
DB37F	DB25M	DB37M	Colour	Function	 37 pole	
5	18		White	JobCom TX-		
6	23		Brown	GND Power		
7	7		Yellow	Tilt L		
8	8		Grey	Tilt R		
9	11		Blue	Extra 7 0-5V Analog		
10	2		Red	12V sensor J15		
11	1		Violet	GND sensor J15		
12	12		Grey/Pink	TTL I/O 1		
14	9		White/Green	Extra 5 SW		
15	19		Brown/Green	Extra 1 frq		
16	21		Yellow/Brown	Extra 3 SW		
17	10		White/Grey	Extra 6 0-5V analog		
18	4		White/Pink	Distance L		
19	6		Pink/Brown	Distance Centre		
37	5		Brown/Blue	Distance R		
36	3		White/Red	Flow 3		
35	22		White/Black	Extra 4 SW		
34	20		Brown/Black	Extra 2 frq		
21		21	Yellow/Grey	Bypass +		
22		22	Pink/Green	Bypass -		
23	17		Green/Blue	JobCom TX+		
24	24		Yellow/Blue	12V Power		
26		26	Green	End nozzle L		
25		25	Pink	End nozzle R		
20		20	Yellow/red	S12-		
1		1	Green/Black	S12+		
3	15		Grey/Blue	JobCom RX+		
2	14		Pink/Blue	I/O Half/Full duplex		
29		29	Black	12V sensor		
30		30	Grey/Red	GND sensor		
31		31	Yellow/Black	Speed		
28		28	Green/Red	Flow		
33		33	White/Blue	Pressure (4-20mA)		
32		32	Brown/Red	Fan speed (frq)		
Wire			Grey/Green			
Wire			Yellow/Pink			
4	16		Red/Blue	JobCom RX-		
27		27	White/Yellow	GND power		
13	13		Grey/Brown	TTL I/O 2		

Technical data:	
Jacked	Black, min 1.5 mm
Working temp	0-70 deg C
Voltage rating	>50 V
Multi-wire	Colour-coded DIN 47100
Thickness	max 15.5 mm

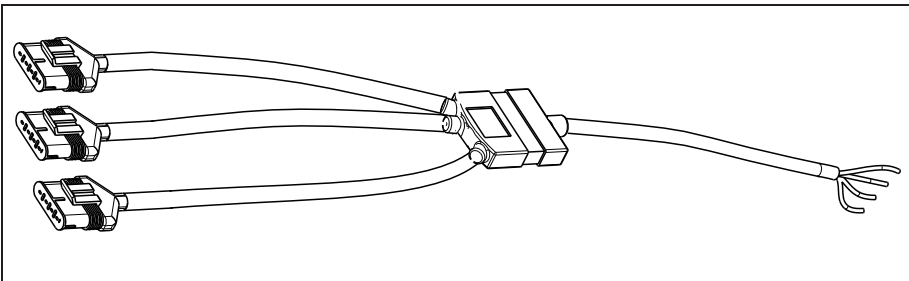
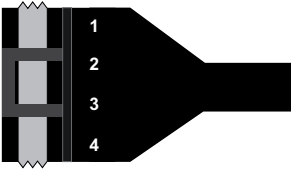
DB25M	DB25F
	

15 - Cables

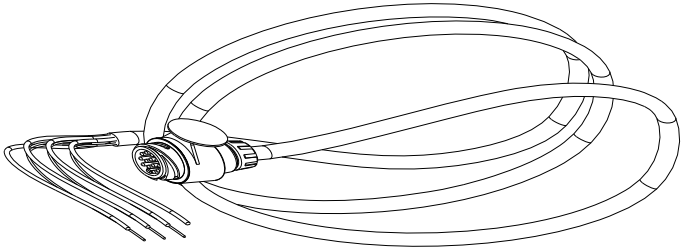
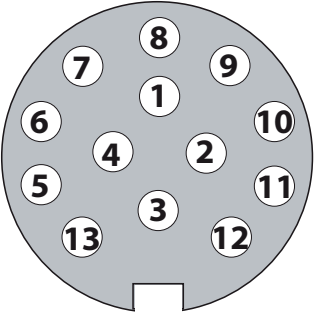
Terminal to cabin cable

				Length meter	Part number
				1,8	26014000
DB25M/3xDB25F	Colour	Function	JobCom		
1		NC			
2		NC			
3		NC			
4		NC			
5		NC			
6		NC			
7	Green	CAN Low	J6 CAN Low		
8		NC			
9	Blue	Power ON	J6 On/Off		
10		NC			
11	Black (Pink*)	12V	J20 +12V		
12		NC			
13	Red (Grey*)	GND PWD	J19 GND		
14		NC			
15		NC			
16		NC			
17		NC			
18		NC			
19	Yellow	CAN High	J6 CAN High		
20		NC			
21		NC			
22		NC			
23		NC			
24	Brown (Brown*)	12V	J20 +12V		
25	Orange (WHT*)	GND PWD	J19 GND	* First version	

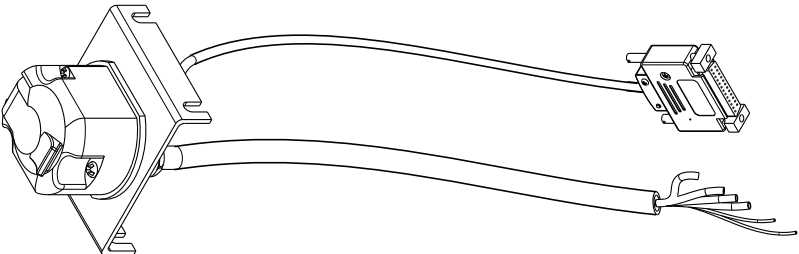
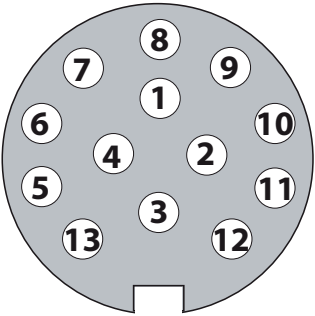
TWIN cable

				Length meter	Part number
				11,7	26023000
AMP 4 pol	Colour	Function	Bare wire		
1	White	GND PWD	PGND		
2	Brown	GND Signal	SGND		
3	Green	+12V	+12V		
4	Yellow	Signal	Sig		

JobCom to tractor cable

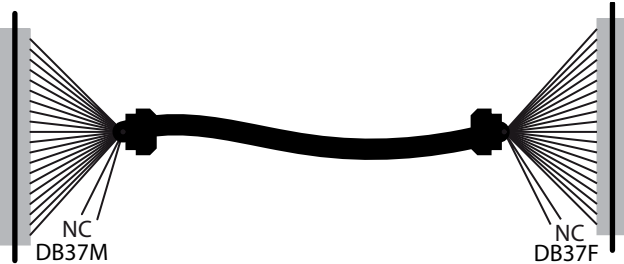
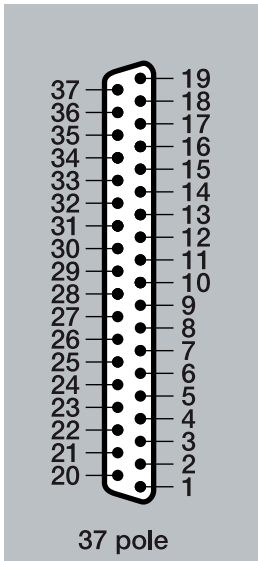
				Length meter	Part number
				6	26013800
					
13 pin ISO 11446M	Colour	Function	JobCom		
1		NC			
2		NC			
3		NC			
4		NC			
5	Yellow	CAN HI	J6		
6	Green	CAN LOW	J6		
7	Blue	On/Off	J6		
8	Red	+12V	J17		
9	Red/Brown	+12V	J17		
10		NC			
11	Black	GND	J17		
12	Black/Grey	GND	J17		
13		NC			

Battery to cabin cable

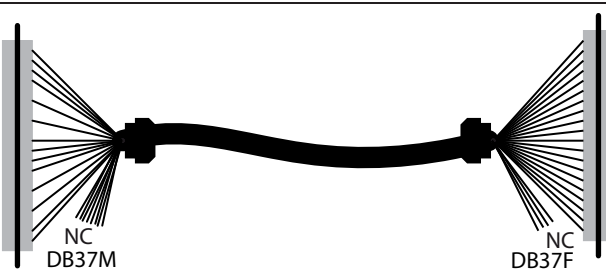
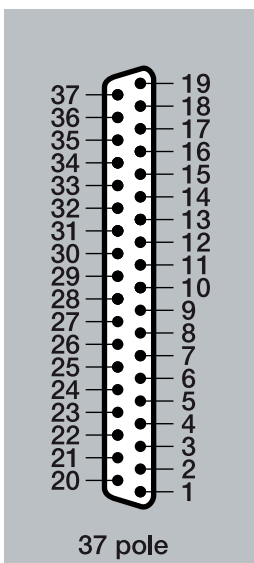
						Length meter	Part number
						6	26013800
							
13 pin ISO 11446M	Colour 13 pin ISO 11446M	Function	DB25F	Colour DB25F	Bare wire		
1		NC					
2		NC					
3		NC					
4		NC					
5		CAN HI	19	Yellow			
6		CAN LOW	7	Green			
7	Blue	On/Off	9	Blue			
8	Red	+12V	11	Yellow	Battery +		
9	Red/Brown	+12V	24	Yellow	Battery +		
10		NC					
11	Black	GND	13	Blue	Battery -		
12	Black/Grey	GND	25	Blue	Battery -		
13		NC					

15 - Cables

JobCom to 13 sec. PCB cable


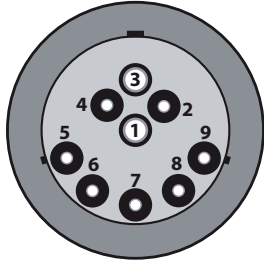
				Length meter	Part number
				7,5	26026400
				9,5	26004900
				<div></div>	
DB37M	Colour	Function	DB37F		
1	Yellow/Grey	S12+	21		
2	Pink/Blue	S11+	2		
3	Grey/Blue	S11-	3		
4	Red/Blue	S10+	4		
5	White	S10-	5		
6	White/Black	S1+	35		
7	Brown/Black	S1-	34		
8	Brown/Blue	S2+	37		
9	White/Red	S2-	36		
10	White/Pink	S3+	18		
11	Pink/Brown	S3-	19		
12	Yellow/Brown	S4+	16		
13	White/Grey	S4-	17		
14	White/Green	S5+	14		
15	Brown/Green	S5-	15		
16	Grey/Pink	S6+	12		
17	Grey/Brown	S6-	13		
18	Red	S7+	10		
19	Violet	S7-	11		
20	Pink/Green	S12-	22		
21	Green/Blue	Bypass +	23		
22	Yellow/Blue	Bypass -	24		
23	Green/Black	S13+	1		
24	Yellow/Red	S13-	20		
25	Pink	End nozzle R	25		
26	Green	End nozzle L	26		
27	White/Yellow	GND Power	27		
28	Green/Red	Flow	28		
29	Grey/Red	12V Sensor	30		
30	Black	GND Sensor	29		
31	Yellow/Black	Speed	31		
32	Brown/Red	Option 2 frq	32		
33	White/Blue	Option 1 4-20L	33		
34	Yellow	S9-	7		
35	Brown	S9+	6		
36	Blue	S8-	9		
37	Grey	S8+	8		
No fct	NC	Grey/Green	NC		
No fct	NC	Yellow/Pink	NC		
Technical data:				<div></div>	
Jacked	Black, min 1.5 mm				
Working temp	0-70 deg C				
Voltage rating	>50 V				
Multi-wire	Colour-coded DIN 47100				
Thickness	max 15.5 mm				

JobCom to 9 sec. PCB

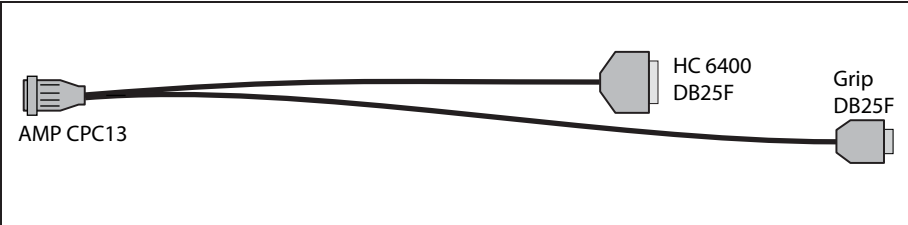
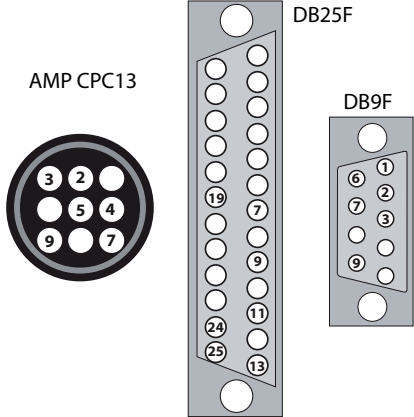
				Length meter	Part number
				9,5	26023800
				Mounted with screw kit 3M Thread: 4-40 UNC	
DB37M	Colour	Function	DB37F	 37 pole	
Wire (to term. J3_5)	Green/Black	FM dn	1		
Wire (to term. J2_15)	Pink/Blue	FM R	2		
Wire (to term. J2_14)	Grey/Blue	FM L	3		
Wire	Red/Blue	No fct	Wire		
Wire	Grey/Green	No fct	Wire		
6	White	S1+	5		
7	Brown	S1-	6		
8	Yellow	S2+	7		
9	Grey	S2-	8		
10	Blue	S3+	9		
11	Red	S3-	10		
12	Violet	S4+	11		
13	Grey/Pink	S4-	12		
14	White/Green	S5+	14		
15	Brown/Green	S5-	15		
16	Yellow/Brown	S6+	16		
17	White/Grey	S6-	17		
18	White/Pink	S7+	18		
19	Pink/Brown	S7-	19		
Wire (To term. J3_6)	Yellow/Red	FM up	20		
21	Yellow/Grey	On/Off+	21		
22	Pink/Green	On/Off-	22		
Wire (to ter. J3_2)	Green/Blue	Pressure+	23		
Wire (to ter. J3_1)	Yellow/Blue	Pressure-	24		
25	Pink	End nozzle R	25		
26	Green	End nozzle L	26		
27	White/Yellow	GND2	27		
28	Green/Red	Flow	28		
29	Black	+12V sensor	29		
30	Grey/Red	GND Sensor	30		
31	Yellow/Black	Speed	31		
32	Brown/Red	Option2 Frq	32		
33	White/Blue	Option1 4-20mA	33		
34	Brown/Black	S9-	34		
35	White/Black	S9+	35		
36	White/Red	S8-	36		
37	Brown/Blue	S8+	37		
Wire	Yellow/Pink	No fct	Wire		
Wire	Grey/Brown	No fct	Wire		
Technical data:					
Jacked	Black, min 1.5 mm				
Working temp	0-70 deg C				
Voltage rating	>50 V				
Multi-wire	Colour-coded DIN 47100				
Thickness	max 15.5 mm				

15 - Cables

JobCom to tractor ISO cable

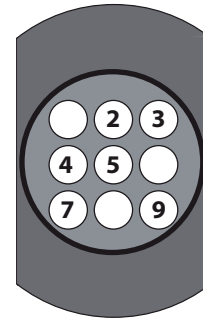
 <div>9p IBBC F</div> <div>Molex MLX 6p</div>					Length meter	Part number
					6,25	26031400
						
9p IBBC F	Colour	Function	Molex MLX 6p	Bare wire		
1	Black	Ground	-	JobCom J17		
2	Black	ECU Ground	1			
3	Red	Power	-	JobCom J17		
4	Red	ECU Power	3			
5	Black	TBC Discon. Con. to pin 4	-	-		
6	Red	Terminating power.	6			
7	Black	TBC Ground	5			
8	Yellow	ISO CAN High	2			
9	Green	ISO CAN Low	4			

HC 6400 and Grip to Cabin ISO Connector

 <div>AMP CPC13</div> <div>HC 6400 DB25F</div> <div>Grip DB25F</div>					Length meter	Part number
					AMP to HC 6400 1,75 AMP to Grip 2,25	26031500
						
AMP CPC13	Colour	Function	DB25F	DB9F		
1	Black	Conn to ECU Power Pin 7	-	-		
2	Green	ISO CAN Low Out	7	2		
3	White	ISO CAN Low In	7	2		
4	Brown	ISO CAN High Out	19	7		
5	Greay	ISO CAN High In	19	7		
6	-	NC	-	-		
7	Purple	ECU Power	9,11,24	1,9		
8	-	NC	-	-		
9	Black	ECU Ground	13,25	3,6		

Cabin connector, CPC13 9W

- 2 ISO Bus Low
- 3 ISO Bus Low
- 4 ISO Bus High
- 5 ISO Bus High
- 7 Power +
- 9 Power -

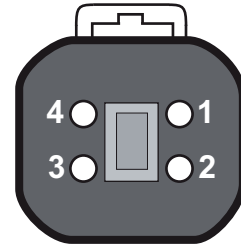


Type of connector: CPC 9way pin contact fixed receptacle,13A

Bus extension connector

- 1 Power +
- 2 CAN High (Implement)
- 3 Ground
- 4 CAN Low (Implement)

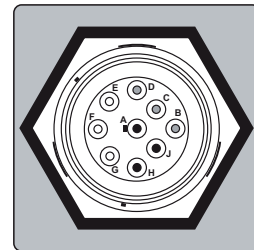
Type of connector: Deutsch DT04-04P, DT06-04S or equivalent



Cabin diagnostic connector

- A ECU GND
- B Power
- C CAN High (Tractor bus)
- D CAN Low (Tractor bus)
- E NC
- F NC
- G NC
- H CAN High (Implement)
- J CAN Low (Implement)

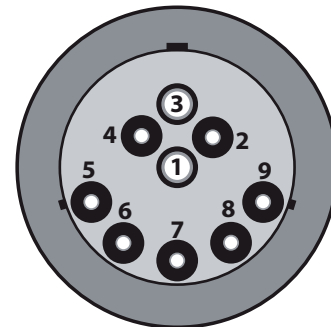
Type of connector: Deutsch HD16-9-1939SE or equivalent



Implement Bus Breakaway Connector IBBC, female, front view.

- 1 GND
- 2 ECU GND
- 3 PWR
- 4 ECU PWR
- 5 TBC DIS
- 6 TBC PWR
- 7 TBC RTN
- 8 ISO CAN_H
- 9 ISO CAN_L

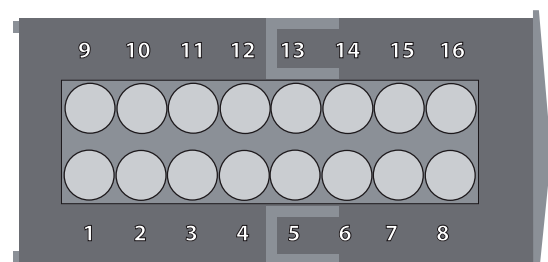
Type of connector: Deutsch HD34-24-91PE, HDBox-24-91P, HDB36-24-91SE or equivalent



ISO Bus bridge connector

- 1. ISO BUS High
- 2. ISO BUS Low
- 3. D+, On/Off switch input
- 7. HARDI CAN Bus High
- 8. HARDI CAN Bus Low
- 9. +UE Voltage supply 12V
- 11. GND
- 13. Out1 PWM, JobCom On/Off 12V

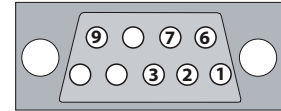
Type of connector: AMP Junior Power Timer 16 pol or equivalent



15 - Cables

Grip / programming connector

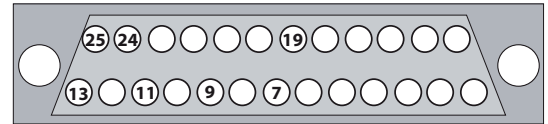
1. PWR On
2. ISO BUS / CAN Low
3. GND
6. GND
7. ISO BUS / CAN High
9. 12 PWR



Type of connector: DB9F

SetBox, HC6500 connector

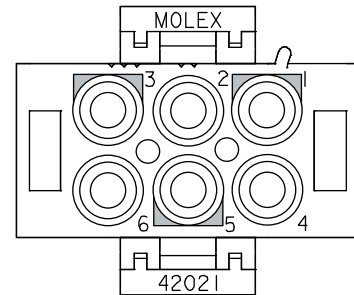
7. ISO BUS / CAN Low
9. Power On
11. 12VDC Power
13. GND
19. ISO BUS / CAN High
24. 12VDC Power
25. GND



Type of connector: DB25F

ISOBUS Implement cable Molex

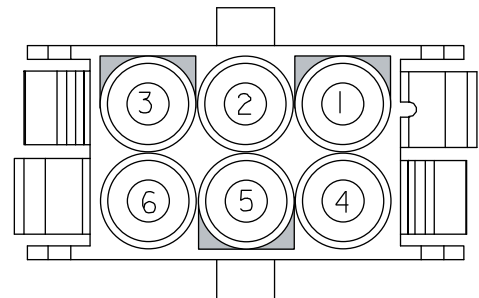
1. ECU GND
2. ISO CAN High
3. ECU PWR
4. ISO CAN High
5. TBC GND
6. TBC PWR



Type of connector: Molex 42021 MLX Female

ISOBUS Implement cable Molex

1. ECU GND
2. ISO CAN High
3. ECU PWR
4. ISO CAN High
5. TBC GND
6. TBC PWR



Type of connector: Molex 42021 MLX Male

Revision versions of this book

P/N 679096-210		Service Manual HC6500		Revision 2.10 GB 04.2011	
Date	Rev.	Subject	Section	Pages	Author
13-03-2010	1.8	Release of manual	All	25	AF
14-03-2008	2.00	Menu tree, Datacom and PrimeFlow added	Ext menu, datacom and PrimeFlow	57	PAO
07-10-2008	2.01	Updated	Menu tree, Datacom, PrimeFlow faultfinding, Sensors.	5-10,13-31, 61-69,70-73	PAO
		Added	Pressure regulation, PrimeFlow description, setup, test, programming. Software error codes.	34, 46-60. 25-26	PAO
		Removed	Guidance for HC6500 setup	(4)	
24-09-2010	2.02	General update	All	92	PAO
13-04-2011	2.10	General update	All	124	PAO
		Rewritten	Track, PrimeFlow, Sensors and Cables	41-50, 69-92, 93-106,107-118	
		New	Index	121-122	

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Spare parts

To see updated spare part information the website www.agroparts.com can be visited. Here all parts information can be accessed when free registration has been made.



HARDI INTERNATIONAL A/S

Helgeshøj Allé 38 - DK 2630 Taastrup - DENMARK

